VOL. 4, NO. 1. JANUARY, 1906.

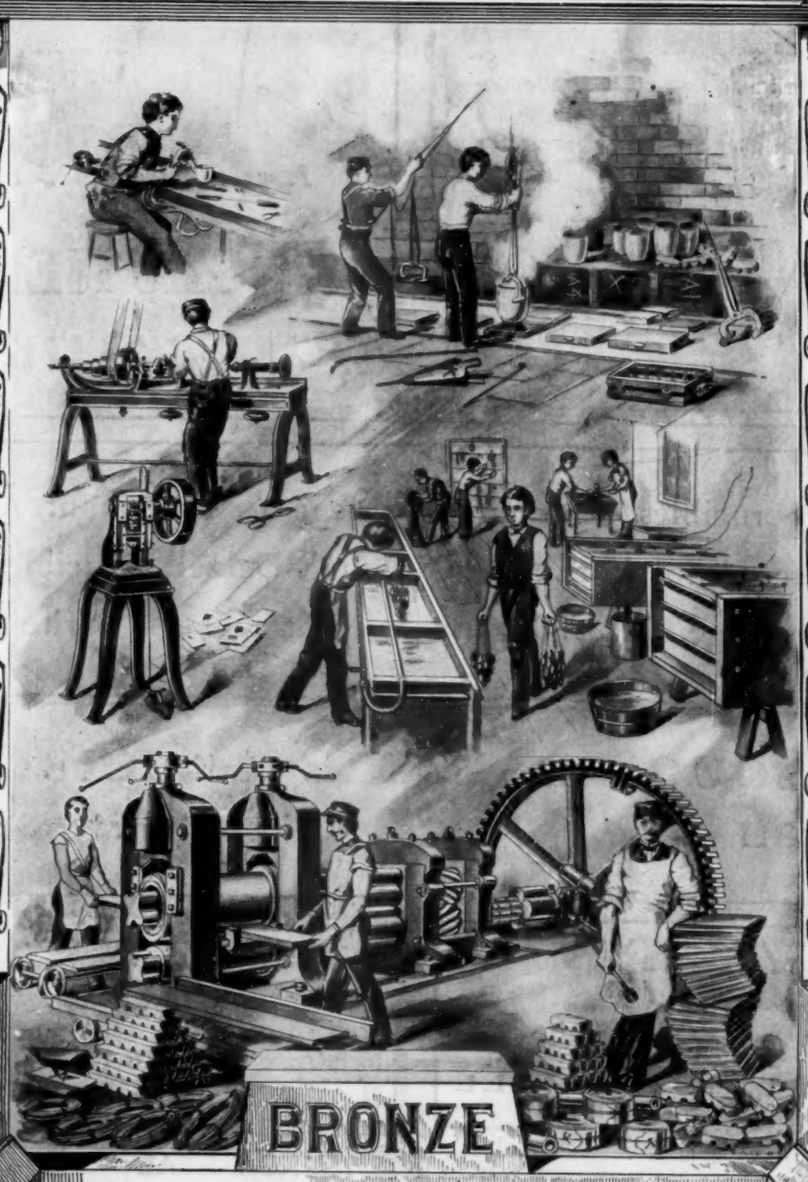
THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD. THE BRASS FOUNDER AND FINISHER
AND ELECTRO-PLATERS REVIEW.

A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

ALUMINUM · COPPER · METALLOGRAPHY · BRASS · METALLURGY · NICKEL · TIN · SILVER · LEAD · GOLD · ZINC · BRONZE

ROLLING · DRAWING · STAMPING · SPINNING · PLATING · POLISHING · SMELTING · REFINING · ALLOYING · CASTING · FOUNDING · FINISHING



OLD SERIES FOUNDED OCT., 1894 FOUNDED JAN., 1903 NEW SERIES

LABOR OMNIA "LABOR CONQUERS EVERYTHING" VINCIT

NEW YORK.

61 BEEKMAN ST.

$1.00 PER YEAR 10 CTS PER COPY

Entered February 10, 1903, at New York, N. Y., as second-class matter under act of Congress March 3, 1879.

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER AND ELECTRO-PLATERS REVIEW
A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

OLD SERIES
VOL. XII., NO. 1.

NEW YORK, JANUARY, 1906.

NEW SERIES
VOL. IV., NO. 1.

THE METAL INDUSTRY
EMBRACING
THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
AND
ELECTRO PLATERS REVIEW

PUBLISHED MONTHLY BY

The Metal Industry Publishing Company

(Incorporated)

61 BEEKMAN STREET, NEW YORK

PALMER H. LANGDON, ... *Publisher*
GEORGE P. SCHOLL, ... *Editor*
JOHN B. WOODWARD, ... *Director*

Subscription Price $1.00 per year, postpaid to any part of the world. Single copies, 10 cents.

ADVERTISING RATES ON APPLICATION.

ENTERED FEBRUARY 10, 1903, AT NEW YORK, N. Y., AS SECOND CLASS MATTER UNDER ACT OF CONGRESS MARCH 3, 1879.

CONTENTS

	PAGE.
Editorial	1
Mixtures for Turbine Wheels	3
Metal Mixture for Valve Work	4
Alloy for Bearing Metals	4
Arithmetic for the Brass Foundry	5
Pure Magnesium and Magnesium Copper as a Deoxydizer	6
Alloying, Rolling, Melting and Annealing of Silver	7
Tumbling Barrel for Polishing	8
British Brass, Silver and Jewelry Trades	9
Dry Galvanizing or Sherardizing	10
New Copper Compound for Plating Baths	11
Uses of Aluminum	12
Satin Finishing	13
Apparatus for Electro-Plating	13
New Automatic Spinning Lathe	14
New Twelve-Inch Double-Head Key Lathe	15
Separating Galvano Plastic Deposits	15
Correspondence Department	16
Patents	19
Trade News	20

ANOTHER GROWTH.

The publishers of THE METAL INDUSTRY take pleasure in announcing that with this issue the journal has again been enlarged by eight pages. It is a source of gratification to them that these continual enlargements as they have been announced from time to time during the past year in these pages have become necessary and they see in it a commendation of the course they have adopted in shaping the policy of the paper in what they consider the best interests of the whole metal working industry. It is also a source of gratification to them that it has never become necessary to go back again to the previous number of pages, but that the growth of the paper has been continuous. Stimulated by this endorsement of their endeavors they are firm in their purpose of continuing the policy thus adopted in the future in the same way as it has been in the past—striving constantly to make the paper ever more valuable to the reader and advertiser. Besides the increase in reading matter, advertising pages and circulation, the present issue contains also a new feature, namely, the Index of advertisements, which no doubt will prove quite convenient and valuable to our readers.

THE YEAR 1905.

When the complete statistical data for the year 1905 can be obtained it will be found that in all probability the production of the metals which are used in the non-ferrous metal industry has again largely increased beyond that of the preceding year. The general prosperous condition of trade all over the world coupled with an unprecedented demand for all kinds of metallic products have combined to stimulate efforts tending towards an increased production of the meals. An era of high prices for the metals largely used in the non-ferrous metal industry showed plainly that the demand was still greater than the supply. Such high prices are, however, not an unmitigated blessing to the worker in metals, and on many sides complaints have been heard of diminished profits owing to the high price of the raw material, in spite of the larger volume of business done. This has been especially true of the small manufacturer, and it has certainly not been conducive to an improvement of the quality of the goods produced. No doubt many a small manufacturer has wished earnestly for a return to normal conditions and normal metal prices. Yet the outlook for lower prices of the metals for the year 1906 is not very hopeful, and it does seem as if some little

time would elapse before the production comes up to the demand.

One of the features of the year just past in common with some of its predecessors has been the tendency towards monopolization of the sources of production of the metals. Such a tendency, though perhaps in keeping with the spirit of the times, cannot but be considered with serious misgivings. The fact that the control of the product of the large industries which is a vital necessity for a great many small consumers is thus placed in a few hands and that the profits accrue to the benefit of comparatively few people is viewed with very mixed feelings on the part of the consumers. It is certain that the economic good of the country will demand at some future time a solution of the trust problem.

Stimulated by the great demand the production of the metals which are used largely in the non-ferrous metal business has, as stated above, largely eclipsed that of the year 1904. That the latter had already far outstripped the year 1903 in the amount of production is shown by the following figures, for which we are indebted to the twelfth annual issue of the comparative statistics compiled by the Metallgesellschaft and the Metallurgische Gesellschaft of Frankfort-on-Main, which has recently appeared. Thus the world's production of copper in 1904 amounted to 651,000 tons, showing an increase of 67,000 tons over the amount produced in 1903. The production is relatively about 12 per cent. higher than during any year since 1883, with the exception of 1888 and 1896. Similarly the production of lead, which had almost remained stationary since 1902, increased to the extent of about 54,000 tons in 1904. Likewise the production of spelter showed a greater increase, both absolutely and relatively, than in any previous year since 1883, inasmuch as it amounted to 54,000 tons or 9.45 per cent., whereas the average yearly increase from 1883 to 1903 was about 5 per cent.

The great role which the United States plays as producer of metals and the great activity which prevailed in this country along these lines is strikingly illustrated by the following figures: In the total production of 651,000 tons the United States participated with 368,000 tons, or about 57 per cent. The United States also shows the greater part of the increase of production inasmuch as nearly 54,000 tons out of the total increase of 67,000 tons in the production during 1904 must be credited to this country. In the production of lead the United States also maintained their leading position with a production of 285,000 tons, while the next highest country, namely, Spain, had 177,000 tons to her credit. Third in line comes Australia, with 120,000 tons, while Mexico occupies the fourth place with 107,000 tons. The total production of lead in the United States from native and foreign sources increased 40,000 tons over that of 1903. The increase in the production of spelter during 1904 was greater in the United States than in any other country, inasmuch as the production increased by 24,000 tons, namely from 142,000 to 166,000 tons.

On the whole as far as the volume of business was concerned, the year 1905 has been a prosperous one for the non-ferrous metal industry, even though, as mentioned above, profits in many cases were cut down by the continued high price of the metals. The progress of the various branches of the art of working metals has been gradual and steady. THE METAL INDUSTRY has faithfully endeavored to keep its readers informed of the progress that has been made in the field of the alloying as well as of the working and plating of the metals. The articles contributed to its columns by various authors who are in touch with the most recent ideas in the different branches of the industry have shown the trend of the progress in the art.

The non-ferrous metal industry, which for many years has lagged behind other branches of industry, inasmuch as it relied largely on rules of thumb for its work, is fast emerging from this condition and is being put on a scientific basis. Scientific investigation of the nature and micrographic composition of alloys have gone far towards bringing light into this difficult matter, and the painstaking labors of a number of scientific investigators in this direction are worthy of the highest recommendation. The art of electro-plating likewise is coming closer to scientific principles than it has ever done before, and electrical measuring instruments are no longer such an uncommon sight in plating establishments as they were not so long ago. These evidences of steady progress are very gratifying indeed and bear bright promise for the future. There is every reason to believe that the year 1906 will be a prosperous one for the metal working industry.

MATT SATIN FINISH ON BRASS NOVELTIES.

The quickest method for applying a matt finish to brass novelties consists in dipping the articles into a matt acid dip. The dip should be made up by using oil of vitriol 1 gallon, aqua fortis 1 gallon, metallic zinc 6 ounces.

The zinc should be first dissolved in the aqua fortis; the oil of vitriol should then be added to the aqua fortis and the zinc. This dip is used warm and must be continually agitated in order to make it work well. If the matt produced in this way is too coarse it may be made finer by adding more oil of vitriol. The articles are cleaned in the ordinary manner, and are then immersed in the matt dip for about a minute. They are then washed, bright acid dipped and silvered in the usual manner. If the operator can spare part of his bright dip he may be able to produce the matt dip quicker by dissolving zinc in aqua fortis and then adding it to the bright dip. A little muriatic acid will assist in developing the matt. It will be well to experiment on a few pieces first in order to get the desired effect.

GOLD COLOR SOLUTION FOR PLATING ON STEEL.

A gold color which is to be added to the regular brass bath, and which is claimed by some Down East platers to give good results is made by dissolving 4 pounds sulphate of iron crystals, 4 pounds bi-sulphate of soda, in powder, 2 pounds sal ammoniac, in 5 gallons of water. A sufficient amount of cyanide of potassium should be used to produce a clear solution. The solution should be diluted for one-half hour. 1½ ounces of this solution should be added to each gallon of brass solution in use. This formula is given with due reserve, and it is always wise to experiment with it first on a small scale.

Some of the large Down East buckle concerns dye their buckles a gold color after lacquering a sample. Finishing in this manner gives a good effect.

MIXTURES FOR TURBINE WHEELS.

By Jesse Jones.

In the manufacture of wheels and distributers for hydraulic turbine plants it is essential that the castings be homogeneous and of uniform structure. If porous areas exist they are very rapidly eroded, the action of the water being assisted materially, no doubt, by the particles of sand and mineral matter that it holds in suspension. This action is comparable to that of the sand blast, and if a wheel is segregated it may be recognized very soon by a mottled appearance of its surface, the hard spots high in tin standing in relief, and the softer spots being worn down somewhat. Spots where slag or oxide have lodged are very quickly disclosed. Porous areas, due to pouring at too high a temperature or the lack of risers, are quickly eroded, especially if they occur on a vane. As the vanes, when the casting is cooling, have the metal drawn from them by the heavy rims on either side, and it is often impossible to feed them with risers, it is to be expected that they may be porous. While the metal is setting in the vanes, the more liquid portions, which are high in tin, are withdrawn into the rims and a spongy area results. This being higher in copper than the rest of the casting, is relatively softer and under the microscope may be seen to consist of a mass of crystalline needles. Nature is said to "abhor a vacuum," and the porous areas are a result of the attempt of nature to fill up with crystals what would otherwise be a hole in the casting.

Any one familiar with the manner in which great masses of rock are torn from the beds of mountain streams and carried along for considerable distances by the force of the water will not be surprised at a similar effect in the vanes of wheels and in distributers in which there are porous spots. The water under pressure, which may exceed one hundred pounds to the square inch, breaks off successively the needle-like crystals of metal that oppose it, and this action continues until practically solid metal is reached that is able to withstand the erosive action. As a result, great holes may be eaten into the vanes and the upper surfaces of the distributer or wheel, if they are not solid, and the turbine is thus ruined or its efficiency greatly decreased.

Unless the design of turbine castings is such that they can be fed by risers or chills so as to be perfectly solid, it is better to use a brass or bronze in them that has very little shrinkage. Manganese bronze, while it has the strength of steel, has, on account of its high shrinkage, proved unsuited to turbine castings as usually designed, simply because porous spots on vanes and the cope side of castings could not be avoided.

FIG. 1.

FIG. 2.

Figs. 1 and 2 show castings of this metal that gave the following physical test:

Tensile strength	66,845 lbs.
Elastic limit	33,104 "
Elongation in 2"	35.5%
Reduction of area	32.7%

These castings were made for a 2,900 H. P. turbine and had been in service only a few months. The water pressure was 109 pounds to the square inch, and the porous areas had been eroded in such a manner as to suggest electrolytic action or "acid in the water" to the minds of certain engineers who inspected the plant. There was no basis for such belief, however, as the water came from a mountain stream, and, while of a slightly brownish color, due to decaying forest leaves, showed no acid reaction. Neither were there any evidences of electrolytic action. The chief evidence against the above theories was the fact that a small

exciter turbine, also made of manganese bronze, which had been working under the same head of water as the larger turbine shown in the illustrations, was found to be as perfect as the day it left the brass foundry. In it the rims and vanes were of about the same thickness, and the brass founder had no trouble in making a perfectly sound casting.

At two other hydraulic plants, working under a head of 55 to 80 pounds pressure, respectively, where wheels made from manganese bronze had been installed, many of the wheels had broken vanes, and in some cases holes had been eaten through the upper rims where the section was light. In one of these plants there were three turbines in which the wheels and distributers had been made of gun metal, but no special record had been kept of the mixture. They had been in service over six years, had the color of old gold, and showed very little wear, except where small oxide or slag spots had been eaten out and a few areas that were of a lighter color and indicated a slight segregation. These castings gave the following physical tests:

Tensile strength	29,360 lbs.
Elastic limit	18,100 "
Elongation in 2"	11.5%
Reduction of area	9.3%

As they had given such good service, although the mixture was much inferior in strength to the manganese bronze, an analysis was made to determine their exact composition, and as a result the following mixture was adopted for future work:

Copper	100
Tin	10
Zinc	4
Lead	1¼

The importance of pouring these castings at a "fair" temperature was shown distinctly by the tests made on one of them where a coupon was poured separately from one of the crucibles as soon as pulled from the furnace, and hence with a very hot metal, while the casting was poured from a bull-ladle into which all of the crucibles (4-200's and 7-150's) had been emptied and in which the metal was much cooler. The results obtained on these coupons were as follows:

	Separate Coupon.	Attached Coupon.
Tensile strength	25,440 lbs.	40,100 lbs.
Elastic limit	19,700 "	18,800 "
Elongation in 2"	6%	38.0%
Reduction of area	9.3%	31.5%

The mixture for this casting was as follows:

C. T. C. ingot copper	3,700 lbs.
Red brass ingot	970 "
Strait's tin	370 "
Illinois spelter	148 "
Lead	23 "

As showing the difference between American and European bronze, a mixture and test of a wheel made by Escher, Wyss & Co., Zürich, Switzerland, is given. This mixture was—

Copper	66
Zinc	31
Tin	2
Iron	1

The physical test of this wheel was as follows:

Tensile strength	62,154 lbs.
Elastic limit	20,154 lbs.
Elongation in 2"	25.2%
Reduction of area	24.0%

Judging from its composition, this wheel would be liable to develop troubles due to shrinkage and porous areas that were found in the case of manganese bronze.

The best material for turbine castings, as ordinarily designed, is a good quality of red brass. It should be either cast into ingots and remelted to secure uniformity, or should contain at least one-third of remelt and should not be poured hot but at a "fair" temperature, so as to avoid segregation and porous castings.

A METAL MIXTURE FOR VALVE WORK.

An alloy which will withstand the action of water under pressure in a metal valve and which is used by one of the largest firms in the country, consists of the following ingredients:

Copper, 10.
Tin, 1.
Zinc, 7-16,
Lead, ⅛.

Channeling is usually due to hard and soft spots in the castings, which result from imperfect mixtures of the constituents. The more tin in the mixture the greater the tendency to segregation. This may be prevented to some extent by running a mixture made from all new metals into ingots and re-melting it, using at least 1-3 re-melt in the mixture. The alloy should not be poured too hot. A mixture which is used successfully by a firm of valve makers who have to deal with very sandy and gritty water, consists of:

Copper, 100.
Tin, 17.
Lead, 3.

Valves on iron pipes of hydraulic systems are often channeled out by iron scale carried along by the water. This scale is almost as bad and abrasive as sand. An increase of lead in the mixture will make a metal which will resist the wear better.

ALLOY FOR BEARING METALS.

A new alloy which is stated to possess a high degree of toughness, combined with a low temperature of fusion, has recently been patented by F. W. Moffett, of Bloomfield, N. J., with U. S. patent 803,921, November 7, 1905. The essential ingredients of the alloy are stated to be lead and sodium, and the production is carried out in the following manner: A quantity of lead is melted in the usual manner and covered with a heavy flux, such, for example, as fluor spar. A suitable amount of sodium, which varies from ½ of 1 per cent to 4 per cent of the quantity of lead, is plunged through the flux into the molten metal. The best results are stated to be obtained by adding approximately 1½ lbs. of sodium to 100 lbs. of lead. The melting point of this mixture is about 585 degrees F.

It is necessary to put the sodium in a cage or other receptacle and fasten this to the end of the stirring rod, so that the two metals can be mixed. When the alloy has coalesced, the metal may be poured into molds and is then ready for use in the same manner as ordinary bearing or babbitt metal. It is stated that other metals may be added to the alloy if desired, but such metals as antimony and bismuth or other ingredients which have a hardening effect on lead will not be necessary and except in minute amounts will be injurious to the operation of the product as a bearing metal.

The specific gravity of lead lies between 11.254 and 11.395, and is only very slightly increased by rolling. This specific gravity is lowered by the presence of other metals, thus furnishing an indication of the softness and purity of the lead.

ARITHMETIC FOR THE BRASS FOUNDRY.

By G. B. Waterhouse.

The need for the application of scientific truths, and the methods of science, to practical work, was never greater than at the present time. In the past days slow methods held their own because the final quality of the product was desired to be as good as possible, and while it is still true that material of the best quality always commands a ready sale, yet the element of speed of production is a strongly determining factor. In these days something that can be obtained quickly and that will answer the purpose well for a time is more desired than something that needs to be made slowly and that will last for a lifetime.

The special field of scientific work in practice is in maintaining the quality of the product at the highest point without lessening the speed of production. The best example of the fruitful results of this kind of work is found in the gigantic steel industry of this country, with its ever persistent forward trend, both in quality and more particularly in the amount produced. Another one which is coming rapidly to the front is the by-product coke industry, almost wholly the result of European scientific research. It is not too much to hope that by working along similar lines, adapted to meet their own conditions, the brass, bronze and allied industries will also achieve like results.

Every brass founder, or to put it more generally, every maker of alloys, has at some time felt the need of being able to make a mixture that would give him an alloy of desired composition. It has been shown that when brass is to be machined, it is very desirable that it should contain about 2 per cent of lead, because the turnings then come off as small chips and not as long spirals, and thus do not clog up the automatic cutting mechanism.

While we are coming, more and more, to realize the influence of certain conditions on the properties of alloys, such as the casting temperature, the rate of cooling, and the heat treatment, yet the great pre-determining factor is the initial composition. It is therefore of prime importance that we should know what mixtures to use to obtain alloys of desired composition.

The best way to express the composition of alloys, and the relative amount of the materials used in making them, is by percentages. This is the way it is given in chemical analyses, and every foundryman understands that it means parts in one hundred. It is almost as easy to say that Muntz metal is 60 per cent copper, 40 per cent zinc, as that it is 3 copper to 2 of zinc; and when dealing with alloys of complex composition the advantages of the percentage basis are readily seen.

In learning what mixtures are to be charged in order to obtain alloys of desired composition, experience is a great teacher and should not be underrated. There is danger, however, of thinking that it is the only guide, which is by no means the case, as by the application of simple arithmetic, combined with some experience, alloys giving any desired analysis can be produced. The chief factor made use of is the equation:—

Pounds × Per Cent = Pounds Per Cent
lbs. × % = lbs. %

If now this lbs. % is divided by lbs., the answer is %, while if it is divided by % the answer is lbs. By means of a few examples the ease of using this method will be made clear.

Case 1. Suppose we desire to make a good standard brass for castings, the final composition of which shall be copper 70%, zinc 30%. To help us we will consider that there is no loss of zinc by oxidation, and that we require 175 lbs. of alloy. Our materials in this case are:

Copper 100% Spelter 100%

First we will find how much copper should be charged.

lbs. × % = lbs. %
175 × 70 = 12250

$$\frac{12250}{100} = 122\tfrac{1}{2} \text{ lbs. copper}$$

The desired weight of alloy multiplied by its percentage of copper gives the pounds per cent of copper in the alloy. This result divided by the copper percentage of the material used to make the alloy gives the pounds of that material to be added.

The amount of zinc necessary will be:

lbs. × % = lbs. %
175 × 30 = 5250

$$\frac{5250}{100} = 52\tfrac{1}{2} \text{ lbs. pure spelter}$$

It could have been obtained by subtracting 122½ from 175, because only copper and zinc are used.

A disturbing element when using zinc is the loss by oxidation, but when this loss is known it can readily be allowed for in the calculations. The loss is not constant but varies with the particular alloy made and the method of production. It can be estimated in two ways which may be outlined. Let us take, for example, the yellow brass we have considered and for the production of which that are charged 122½ lbs. copper and 52½ lbs. zinc. If there had been no loss of zinc, the final composition would have been copper 70%, zinc 30%. Instead of that an analysis shows it to run copper 71.5%, zinc 28.5%.

First we want to know what weight of alloy we have. We know that the 122½ lbs. of copper constitute 71.5% of this weight, because no copper has been oxidized; from this we soon find that the weight equals 171 lbs. 28.5% of this amount is zinc, which equals:

$$171 \times \frac{28.5}{100} = 48.7 \text{ lbs.}$$

Thus, out of the 52.5 lbs. of zinc charged, 3 8/10 lbs. have been oxidized, which is a loss of about 7½%.

The other way to determine the loss is to weigh the resulting castings and runner heads, and the loss in weight being known to be due to oxidation of zinc it is easy to calculate the percentage loss. In this case the weight would be 171 lbs. instead of 175 lbs. The 52½ lbs. of zinc lost 4 lbs., which is a percentage loss of about 7½%.

The way to use this knowledge is to take the spelter as contributing 100 – 7½, that is 92½% zinc.

We can now calculate again for our 175 lbs. of yellow brass.

Copper. lbs. × % = lbs. %
175 = 70 × 12250

$$\frac{12250}{100} = 122\tfrac{1}{2} \text{ lbs.}$$

Zinc. 175 × 30 = 5250

$$\frac{5250}{92.5} = 56\tfrac{1}{2} \text{ lbs.}$$

That is: 122½ lbs. copper
56½ lbs. spelter

Case 2. In most cases it is desirable to have a little lead present, and we will now take an example of this kind

The composition desired is:

Copper 68%, zinc 30%, lead 2%.

Our materials are:

Copper 100%, spelter 92½% available, lead 100%, and we will make 175 lbs. of alloy.

	lbs. × % = lbs. %
Copper.	175 × 68 = 11900

$$\frac{11900}{100} = 119 \text{ lbs.}$$

Zinc.	175 × 30 = 5250

$$\frac{5250}{92\frac{1}{2}} = 56\frac{1}{2} \text{ lbs.}$$

Lead.	175 × 2 = 350

$$\frac{350}{100} = 3\frac{1}{2} \text{ lbs.}$$

Thus we require copper 119 lbs., zinc 56½ lbs., lead 3½ lbs.

Case 3. A typical gun metal may be considered. A common analysis is approximately:

Copper 88%, tin 10%, zinc 2%.

Our materials are copper 100%, tin 100%, zinc 92½% available, and we will make up only 80 lbs.

	lbs. × % = lbs. %
Copper.	80 × 88 = 7040

$$\frac{7040}{100} = 70\,4/10 \text{ lbs.}$$

Tin.	80 × 10 = 800

$$\frac{800}{100} = 8 \text{ lbs.}$$

Zinc.	80 × 2 = 160

$$\frac{160}{92\frac{1}{2}} = 1\,6/10 \text{ lbs.}$$

We must take therefore: Copper 70 lbs. 6 oz., tin 8 lbs., zinc, 1 lb. 10 oz.

Case 4. Phosphor Bronze. This will vary in analysis to meet different requirements. An average analysis will show about as follows:

Copper 89%, tin 10%, phosphorus 1%.

The materials are: Copper 100%, tin 100%, phosphor tin 90%, tin 10% phosphorus.

There will be a loss of phosphorus due to oxidation which must be estimated and allowed for like the zinc in the brasses. We will make up 150 lbs., and for the purposes of calculation neglect oxidation.

	lbs. × % = lbs. %
Phosphorus.	150 × 1 = 150

$$\frac{150}{10} = 15 \text{ lbs. Phosphor Tin}$$

Copper.	150 × 89 = 13350

$$\frac{13350}{100} = 133\frac{1}{2} \text{ lbs.}$$

Tin.	150 × 10 = 1500
The phosphor tin adds	15 × 90 = 1350
Which leaves	150

$$\frac{150}{100} = 1\frac{1}{2} \text{ lbs. tin.}$$

The mixture is therefore:

Copper 133½ lbs., tin 1½ lbs., phosphor tin 15 lbs.

It would be easy to multiply cases, but it is sufficient to say that aluminum bronze, manganese bronze, sterro metal, the solders, white metals, and, indeed, any alloy can be calculated in similar ways. It will be seen how necessary it is to accurately weigh out all the metals entering into the alloys. For this purpose two sets of scales are very convenient, one, large, for weighing the greater quantities, and another to weigh down to fractions of an ounce.

The above cases will not always fit in with practice, as the mixtures would be too expensive except for the best alloys. Economy will come in the skillful use of the various grades of scrap produced, which should be analyzed if necessary and kept in separate bins.

PURE MAGNESIUM AND MAGNESIUM COPPER AS A DEOXYDIZER.

Pure magnesium and magnesium copper are used as deoxydizers for the making of sand castings of New Silver and Argentine alloys, pure aluminum, aluminum alloys and Britannia metal. Only a really pure magnesium will give perfect deoxydizing results and magnesium of inferior quality cannot be recommended. The following directions for the addition are given by a German exchange:

In case New Silver and Argentine alloys must be deoxydized and the castings made from them must be exceedingly tough, only pure magnesium must be used. Should on the contrary the castings be as hard as possible, toughness not being required, 50 per cent magnesium copper must be used. The castings after having cooled off must show an even dark green shade on the outside. The magnesium preparations only fulfill their deoxydizing purposes when they come into intimate contact with all parts of the melting bath. These purposes are obtained when the magnesium preparations are added to the molting metal alloy baths shortly before pouring out. The addition takes place by dipping the pressing ladles (or stirrers) on the bottom of the crucible while diligently stirring the bath. The graphite ladles can be kept together on the upper end by means of an iron tube, or, better yet, long handled pincers (or tongs). For Britannia alloys long handled iron pincers (or tongs) are used. For New Silver and Argentine alloys the same iron pincers may be used, but in this case the lower end which comes into direct contact with the melting bath must be of pure nickel. The last condition is absolutely necessary if it is of great importance that the alloys should be exceedingly tough. If this is not necessary, pincers made entirely out of iron could be used.

The addition of magnesium must be from ⅓ to 1½ per cent.; the higher the nickel contents are, the larger must be the addition of magnesium. When New Silver and Argentine alloys are made a previous deoxydizing must take place before adding the zinc. This is done by making at the same time to the copper and nickel an addition of ½ to 1½ per cent. manganese. The manganese, however, must be free from iron and carbon. Several works make their New Silver and Argentine from nickel cartridges, copper and zinc. In this case the preliminary deoxydation must be done with manganese copper free from carbon and iron and the magnesium is added with a view to the final deoxydization as explained above.

For the deoxydation of aluminum bronzes the magnesium is added in the way as indicated above. The right addition of magnesium can be recognized by the fact that the cooled-off sand castings show an orange-like color on the outside.

For the deoxydation of pure aluminum alloys only pure magnesium must be used in the same way as explained above. The addition of pure magnesium can amount to from ½ to 3 per cent. The aluminum alloys are materially improved by the addition of magnesium.

ALLOYING, ROLLING, MELTING AND ANNEALING OF SILVER.

By Edward E. Newton.

Silver is a soft white metal, which is very malleable and ductile. It has a brilliant lustre and is susceptible to receiving a very fine polish. It is not acted upon by the atmosphere or by moisture, but is readily blackened by sulphur. Articles of silver often become tarnished merely by being exposed to the sulphurous gases which are diffused in the atmosphere of houses from coal fires. The use of lacquers has become quite common for the purpose of preserving the finish or the polish of the silverware which is thus exposed. There is, however, a great deal of fault found with the lacquered work, as the lacquer is liable to be broken, especially after the article is rubbed over a few times for the purpose of cleaning it. The parts from which the lacquer is thus removed quickly become tarnished.

The only salt of silver of any practical importance is nitrate of silver. This salt is well known by the name of lunar caustic. Nitrate of silver is formed by dissolving silver in nitric acid diluted with twice its weight of water. This solution is then evaporated until the crystals, which are nitrate of silver, remain as a residue. The salt is soluble in one-half its weight of boiling water and its own weight of cold water. It is very caustic when it comes in touch with the skin. From this solution metallic copper precipitates the silver as a fine powder. A great deal of it is used in conjunction with tartaric acid, caustic potash, alcohol and grape sugar, for silver deposits on glass.

BLISTERED SHEET SILVER.

UNBLISTERED SHEET SILVER.

Chloride of silver is occasionally found as a product of nature in the shape of a mineral and is called horn silver. It is formed artificially by means of chloride of sodium and hydrochloric acid. This is added to the soluton of nitrate of silver and the addition is continued until the precipitate ceases to form. It is then washed until it is thoroughly clean. In this form it is frequently used by platers together with potassium cyanide for making up a silver plating solution.

The best metal to be alloyed with silver is pure grain copper. In order to make sterling silver 925-1,000 fine there are used 8 per cent. of copper, that is to say, if one has 128 7-20 ounces of fine silver, this figure is to be multiplied by 8 per cent., which will give 10 26-100 of pure copper, which is to be added to the above amount of fine silver. This combination will make standard sterling silver. Zinc has been used by some people who had an idea of whitening the silver. This, however, has been done mostly in cases where silver has been alloyed below 925-1,000, and then the metal zinc has been added only in small quantities, inasmuch as the advantages obtained in this way hardly overcome the objection of having such a metal mixed in with the silver.

The specific gravity of metallic silver is 10.552, which means that one cubic foot of it weighs about 600 pounds Troy. The ductility of the metal is little inferior to that of gold. It is, however, harder and more elastic than tin or gold, but less so than either platinum, copper or iron. Its melting point is about 1,873 degrees Fahrenheit. If it is kept some time in fusion it absorbs large quantities of oxygen, which is given off again when the metal cools. The cracking and blistering of silver is usually due to improper melting. Silver poured at too low a heat will blister and crack, and if it is poured too hot it will blister and strain. A practical melter can usually tell when his heat is right by the appearance of the metal in the crucible. When the silver is all melted a cover should be placed on the crucible and the metal should be allowed to remain in the furnace about five minutes longer. Of course, a great deal depends upon the kind of furnace which is used. The ingot molds should always be warmed before the metal is poured into them and the pouring should be done in a steady, even stream.

The idea of rolling the silver when it is hot is unnecessary. The metal seems to work harder than when it is treated in the regular way. I have seen two and three thousand ounces of silver melted and poured at one melting. The first batch would come out all right, but the last ones would sometimes not come so good. This was probably due to the fact that the metal had become chilled after half a dozen ingots had been made. The operator should be sure that the metal is at the right heat before it is poured, and if this precaution is taken, I do not think that there will be any trouble with blistering or cracking.

When silver is melted and poured in the ingot molds there is no fire coat on its surface because the oxygen of the atmosphere has had no chance to get at the surface of the metal. After rolling to a certain gauge a bar of silver must be annealed as the metal becomes very hard during the process of rolling. The best way to perform the annealing operation without producing the fire coat on the surface is to anneal the metal in a vacuum, or at practically a vacuum. In this way what little oxygen is left in the muffle at the time is easily disposed of without hurting the surface. A bar of silver may be annealed as many times as necessary without having any fire coat appearing on its surface by doing it in a muffle in this way. The purpose of conducting the annealing in a vacuum is to get rid of the oxygen which acts on the alloy in the metal and causes the oxidation of the surface which takes place when the metal is annealed in the open.

Another method for annealing sterling silver without producing the fire coat consists in coating the surface of the silver with boracic acid. This is made into a paste and painted over the surface with a brush be-

fore it is annealed until the metal is thoroughly covered. This method is also used by some people in the manufacture of gold and rolled plate work.

There is also a patented compound in the market which is used for the same purpose, and when this is painted over the work to be annealed it will always prevent the formation of the fire coat. A great deal of silverware is to be whitened on the inside. This is usually done after the work is all finished and ready for polishing. The surface is painted over with the patent compound and the article is then annealed and pickled in sulphuric acid and water. The pickling solution is composed of one part of acid and 16-18 parts of water and is used hot. This procedure serves to whiten the inside and also cleans the compound off the outside of the article.

THE USE OF THE TUMBLING BARREL FOR POLISHING SMALL ARTICLES.

By Herbert J. Hawkins.

To get good and satisfactory results from this method of polishing, one must have the proper appliances to begin with, must use proper methods and materials, and lastly must give the work in operation plenty of time if it is to be a highly polished and finished job. In the first place the tumblers should be horizontal, either octagon or circular. If circular, cleats or slats should be placed inside at equal distances apart, so as to cause the work to tumble and not allow it to cling to the sides of the tumbler and slide. The latter does not have the polishing effect which the tumbling produces.

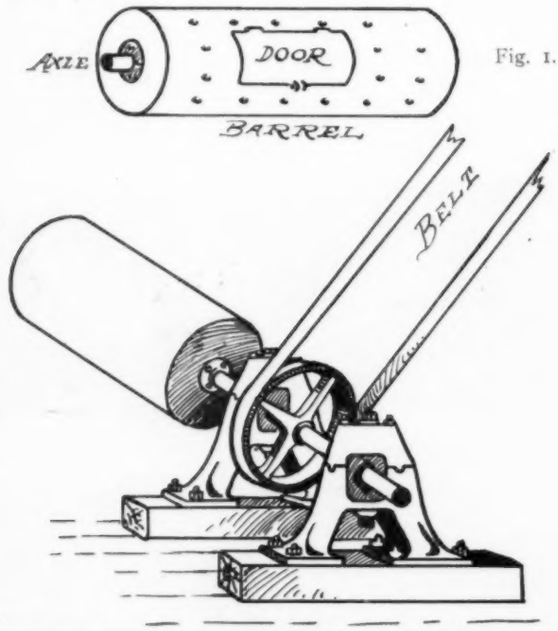


Fig. 1.

BARREL FOR WET POLISHING WITH SOAP-POWDER AND WATER.

The best tumbling barrels for small work, such as buckles, trunk hardware, furniture and trimmings, and in fact any and all small steel stampings or iron castings, is one made from boiler iron or sheet steel about ¼ inch thick. A good serviceable size is about 1½ feet in diameter by 3 feet in length, with a door, cut in one side, on hinges and a hasp to fasten it shut. A barrel of this kind is shown in the accompanying illustration, Fig. 1. This tumbler will be found cheap to have made. Any boiler shop can make it and it will give good service and never wear out. The axle shaft does not run through the tumbler, but is bolted on the outside at each end, as shown in the figure. A pair of ordinary shaft hangers, bolted to the floor, will answer for the bearings. A tight and loose pulley is attached to the shaft. This gives an easy and quick method of starting and stopping the tumbler.

The tumbler for the first operation should have small holes drilled through the sides in rows about six to eight inches apart each way. This will allow the fine particles of steel, which are continually being ground off in the polishing operation, to sift through the tumbler, thereby keeping the work being polished clean and bright. If the tumbler is tight or nearly so, the fine particles of steel are ground into a metallic powder and are imbedded into the work. If this takes place a black lustrous film is produced over the work, similar to stove polish. If this film is allowed to form upon the work, it prevents the polishing and thus defeats the real object in view.

Tumblers with a suction fan attachment will remove the dust as fast as it is ground off, but the tumbler just mentioned is cheaper and will do the work as well. The work cannot be properly polished unless the dust and grindings are removed as fast as made.

The work, if cold rolled steel stampings, should be perfectly freed from grease and oil by rolling in sawdust for about an hour. The articles should then be put into the perforated steel tumbler, half filling the tumbler, and should be allowed to tumble from five to six hours at a speed of about 30 revolutions per minute. This operation will impart a clean, bright finish to the work and will remove all roughness, scale or sand. Then if a more finished job and a higher polish is required, shoe leather scraps are used for three hours more, either in a tight tumbler, or in the same one. Care must be taken to remove all greasy and oil bits of leather as they do more harm than good.

When the work comes from this operation it should be bright and smooth. Powdered rouge is sometimes added to the leather to finish the work. If this is done, it should not be until about one hour before the work is to be removed. The leather scraps must not be fine or powdered, but ordinary shoe shop scrap. Sole leather is best, without any oily pieces left in it. It is imperative that the work be given plenty of time to tumble in order to get the best results.

A still finer finish may be given this work when it comes from the leather. If a higher polish and more lustre is required, part of the work may be put into an oblique tumbling barrel and enough soap powder, with a little water added, to make a thick creamy lather. If the work is allowed to run in this for about one hour, the polish and finish will be well nigh perfect. The work can remain in this tumbler until it is ready for the plating, as the soap protects it from rusting or discoloring. In polishing work in tumblers, time is the essential item. Rough and sandy work must have a long time to tumble to make a finished job. It is also necessary to remove the dust and particles of metal as fast as ground off, either by having the tumbler perforated as described or by the use of a suction attachment.

THE BRITISH BRASS, SILVER AND JEWELRY TRADES FOR 1905—OUTLOOK FOR 1906.

By J. Horton.

The year just ended, to quote the phrase of a large Birmingham manufacturer was for artistic metal workers, "like the curate's egg, good in parts." Some houses found curious contrasts between consecutive months, but the most important fact is that it ends very much better than it began. The close of the year found all factories full of work, and many working overtime. This is especially true of the brass trade, in which makers say they are being "rushed out of the place for orders." This is partly due to the very low condition of stocks. For all descriptions of cabinet brass foundry stocks had almost vanished when various signs made consumers realize that the time of the tide had come. The upward movement began about August, and since that time, owing to better trade and the higher price, both of copper and zinc, two advances of five per cent. have been made in the price of finished brass by the Associated Manufacturers. But for certain descriptions, made only by unassociated houses, the advance has been only five per cent. This applies to gas fittings and electric light fittings generally. In regard to the profitableness of these branches, that is another story. One house which formerly paid £32 per ton for its raw material now has to pay £52. But for increases of output and other economies their goods would be made at a loss. On all hands it is agreed that margins of profit are painfully small and that better prices must be had.

A useful test of the revival is the expenditure in respect of unemployed benefit by the Brassworkers' Union. In the first quarter of last year it was £948. This year the figure was £662. In the next quarter the figures were £852 and £556, respectively, and for September £1,032 and £639, respectively. The last quarter of the year, when the figures are issued, will show a still greater fall. Probably out-of-work pay would be much lower but for the fact that the capstan lathes and other labor saving devices are replacing male with female labor, very much to the disgust of the men. But the manufacturers' point of view is put strongly by an employer who points out that an article which formerly cost 1s. 6d. to make, is now produced for 3½d. This kind of thing will increase, but manufacturers contend that it is not ousting the men to the extent the latter suggest, inasmuch as the cheapening of goods is generally enormously increasing the output and opening up new spheres of employment. But it is admitted that a boy at a few shillings a week can produce more work than a man, and a revolution is therefore taking place, rapid strides in this direction having been taken during the year.

Among the best branches has been that of brass fenders and bedstead mounts, which have shown a marked revival. Though the electrical line has left much to be desired, there have been some notable orders, among which may be especially named the equipment of a number of South African municipal and political offices with very handsome and expensive electroliers. In the fender and domestic equipment line there is a marked tendency to buy better goods, which is causing much satisfaction. Another matter on which there is some congratulation is that the extravagant designs, in some cases approaching caricature, which were in vogue a year or two ago, are rapidly going out. Buyers are reverting to more natural and wholesome tastes and discarding ugly and unnatural distortions. At the same time new patterns are continually being made, the public taste or fancy being arbitrary and inexplicable as ever. Why certain articles have a run and others are discarded is still an enigma.

Behind the scenes a good deal of controversy is going on in the trade with regard to tariffs. It was initiated by the Tariff Reform League, which issued a leaflet showing the comparatively large imports of brass into this country. But this was promptly met by the secretary of the Brassworkers' Association with another showing that imports of copper and zinc had increased between 1887 and 1902 from 249,000 tons to 365,000 tons. A tax of ten per cent. upon this raw material, it was argued, will add to the cost of production by 20 per cent., which would lose us the foreign markets, unless men were prepared to sacrifice the equivalent in wages. A further leaflet shows an increase in brass exports from £458,233 in 1893 to £613,441 in 1902, and an increase of 27 per cent. in five years. The leaflet concludes: "We have too much at stake to be fooled by misrepresentation. The brass work made in Birmingham makes its way all over the world and we send out much more than double that which is sent into this country. The foreigner will refuse to have your brass work if you will not have his. This would ruin the brass trades of Birmingham and throw out of work 1,500 men. In the dark days of protection only a few factories making brass work existed. Under free trade there are thousands, and much bigger than the old ones. Resist by your votes the cursed protection which comes to steal your bread and meat."

The divisions of opinion on this question are astounding. Nothing is more common than to find two partners in a firm in completed disagreement on this question, or an employer advocating taxes, while his manager openly talks free trade. However, it is agreed on all hands that a prosperous year is in store in 1906 for the brass trade, and this is the main fact at the moment.

The various artistic metal trades have an equally cheerful outlook. Prospects were never brighter. In spite of the dearness of silver, which is believed to be temporary, this metal continues to replace electro-plate for many small articles. One of our largest firms has during the year had an extraordinary run on table and ornamental ware for ocean liners, having had apparently a practical monopoly of this class of trade.

In the jewelry trades the year is ending with quite a rush of business. A curious coincidence, often noticed, is that the iron and jewelry trades maintain a fairly even parallel. The recovery of activity dates almost exactly from the late summer, when the iron trade took a decided leap upward. The figures of the trade, issued in July by the Assay Office, when the jewelry year terminated, were not specially encouraging. Gold wares had fallen from 329,572 ounces the previous year to 323,610 ounces. Silver, on the other hand, had increased from 3,682,920 ounces to 3,689,065 ounces. But the real growth of trade is best seen by comparing these totals with those of 1895, when gold yielded 239,472 ounces and silver 1,796,056 ounces. There are checks now and then, but the general trend is very decidedly forward.

Of the class of trade done the general quality has been medium. For really best ware there has been a falling off in demand. There is a strong feeling among jewelers on the question of foreign competition, especially with Germany, and one authority declares that if a canvass were taken ninety-five per cent. of the manufacturers would like to see Mr. Chamberlain's fiscal policy adopted, with the object of keeping out the cheap German stuff. It

should be noted that dealers pure and simple are not included in this calculation, their object being to buy in the cheapest market. From the purely artistic point of view, jewellers consider themselves in a better position than ever to cope with the foreigner who, in the past, it is admitted, has been able to send over a proportion of designs, though of inferior quality, that have taken the eye more effectually than the British articles. But the various art schools are now affecting the supply of skilled workman, and the influence of the schools is bearing better fruit every year. The artistic perception shown in the past by German makers will now be met on its own ground.

As in the brass trade, satisfaction is expressed at the improving taste of the people. What is called the new art style is decidedly on the wane, and a healthy reaction is manifested in the direction of adopting natural forms for ornamentation. The recent rush of activity has so affected the labor market that practically there are no skilled hands out of work. One large manufacturer states that for several days he has been advertising for a polisher and has failed to get a single applicant. A year ago there was a widely different state of affairs. The shops are all now full of hands, and in a great many cases are working overtime. A notable improvement is manifested in the exports to nearly all markets, the Colonial improvement being very acceptable. For a long time the Cape and Australia have been very poor buyers.

In regard to the effect of the Canadian preferential tariff, experiences vary a good deal. In some lines there have been some fair parcels sent out, but other makers express great disappointment. One house, for example, which turns out the best quality of sleeve links failed absolutely to get a footing in the Dominion, although they sent out a special traveling salesman. Yet in regard to its general trade this firm, one of the oldest in Birmingham and having a world-wide reputation, declare emphatically that the year just closing is far and away the best they have ever had. In regard to their Canadian failure, they frankly attribute it to the fact that their goods were not precisely of the kind which the Canadians prefer, and as the Birmingham house was extremely well off for trade, they did not consider it worth their while to cultivate a Canadian specialty.

It is admitted that Germany is a severe competitor in Scandinavia generally, but this is mainly due to the fact that the English dealers, almost without exception, have no travelers capable, by their knowledge of the language and the ways of the people, to push the British wares. Now the trade is improving, it is less likely than ever that enterprise will be shown in this direction. As to the cheapest class of goods of the gilt and paste jewelry kind, it is known that enormous quantities are being turned out, and apparently the local makers can hold their own against the world in this line. But of these commodities, of course, the Assay returns take no cognizance. On all hands the year 1906 is looked forward to with the greatest cheerfulness, the feeling being partly stimulated by the belief that, alike with silver and copper, the present dearness is a purely temporary condition, and the inevitable slump will bring a welcome relief to the important metal trades, which use such large quantities.

It should be added that a federation of metal workers, including gold and silver smiths, coppersmiths, electroplaters, Britannia metal workers and nearly thirty other branches of the light metal trades, has just been formed in Birmingham, with the object of raising the status of the workers and securing co-operation in emergencies. It starts with a total membership of close upon 37,000, but its future operations are not causing the manufacturers much anxiety.

DRY GALVANIZING OR SHERARDIZING.

A new process for galvanizing, the so-called dry galvanizing, which has been invented by Mr. Sherard Cowper-Coles, was described at length and illustrated in the August, 1904, issue of THE METAL INDUSTRY. The following are some further particulars about the process: The galvanizing in this method is carried out by means of zinc dust, and the articles are placed in a drum which is charged with zinc dust and heated to a temperature of from 500 degrees to 600 degrees F. for a few hours and then allowed to cool. The new process is not limited only to the coating of iron with zinc, but it is also stated to have been successfully applied to the coating of iron with aluminum, copper and antimony. It has also been applied to the coating of other metals with zinc, such as for instance aluminum and copper. It is stated that copper and its alloys when they are subjected to this process can be rendered extremely hard.

The surface of the metal coated by the dry galvanizing process is distinct from that obtained from cold galvanizing or hot galvanizing. It resembles more that obtained by cold galvanizing than by hot galvanizing, but is more lustrous and metallic and uniformly distributed over the whole surface. Some pretty effects have been obtained in the decoration of metallic surfaces by the Sherardizing

IRON INLAID WITH ZINC.

process. The result is stated to be different from anything that has hereto been obtained in art metal work. The designs of patterns are not only inlaid into the surface, but are raised at the same time, and it is claimed that the metals are blended together and form a variety of alloys of many colors and tints. The thickness and depth to which the metals can be deposited can be controlled at the will of the operator. The process is stated to be capable of being applied to a large variety of metals and to have the advantage that many alloys can be formed in the one operation of baking.

The process is carried out in the following manner: The articles are first coated with a stopping-off compound so that those portions which are to be covered with zinc are left exposed. The articles are then placed in the box which contains the metal to be inlaid in a powdered form. They are baked at a temperature which is several hundred degrees below the melting point of the inlaying metal. The depth of the inlaid metal depends on the length of time the articles are baked and upon the temperature used during the baking period. The intermediate effects of alloys and coloring are obtained by the manipulation of the stopping-off material. The process

is stated to be inexpensive and its application is possible to the finest damascening, or, on the other hand, to a bolder class of work.

In the accompanying illustration there is represented a specimen of iron inlaid with zinc. Among other effects which can be obtained by this process are copper trays inlaid with zinc. The materials are so arranged that a considerable portion of the copper is converted into gold color brass, and a very soft effect is thus obtained with great subtlety of color. Silvery zinc may be obtained from a plain background and it is stated that by altering the preliminary treatment and by varying the length of time of baking it is possible to act upon the base metal in such a manner as to obtain instead of the copper very beautiful effects which range from silver white zinc to yellow brasses and bronzes of various shades up to red copper. The articles are kept stationary during the process of baking.

A NEW COPPER COMPOUND FOR THE PRODUCTION OF COPPER, BRASS AND BRONZE BATHS.

By Charles H. Proctor.

Within recent years there have been very few new chemicals or compounds added to the list of those products which are used in the art of electro deposition of the metals. Very recently, however, there has appeared in the American market a substance known under the name of prepared red copper. This substance is to be used in the preparation of copper, brass and bronze solutions. Its chemical name is cuprous oxide or red sub-oxide of copper. It resembles in color the pigment known as Indian red and is imported from Germany. From samples that have been submitted by chemical houses in this country to the writer nothing has been found of domestic manufacture that would exactly compare with the German product. In that country the product is used very extensively in the preparation of alkaline baths for copper, brass and bronze deposits.

From experiments made by the writer it has been found to give very excellent results which far exceed his expectations, owing to the great ease and to the short time required for the preparation of either of the above mentioned baths and to get them ready for working condition regardless of quantity. There does not appear to be much doubt that this material will soon surpass all other copper compounds used in the preparation of solutions of the above nature. Prepared red copper contains about three times more metallic copper than either the carbonate or acetate salt. Its cost of 55 cents per pound in 100 pound lots seems high in comparison with other compounds that are in current use, but when the metallic contents are taken into consideration it will be found to be cheaper. This is due to the small amount which is necessary to produce either of the baths mentioned.

An electrolytic deposit of copper obtained by using this material is of a beautiful red color. It is very adhesive and durable and deposits of great thickness can be produced in a short time without danger of the deposit blistering or peeling. It has been found especially valuable for copper, brass and bronze plating of iron, steel, zinc and the antimony alloys of lead.

In the preparation of the plating bath for these metals it is not necessary to make any addition whatever of ammonia or ammonia compounds. Thus the danger of the formation of oxygen is excluded and one of the most prolific causes of non-adhering deposits, of peeling and of blistering, is therefore removed.

The proportions of chemicals used by the writer in the preparation of his baths are as follows: For a very excellent copper bath on a 10-gallon basis there are used:

Ten ounces prepared red copper.

Twenty-five ounces cyanide of potassium, commercially pure.

Twenty-five ounces sodium bisulphide.

For the preparation of the bath the cyanide and the copper are mixed in one-third of the amount of water used cold; the sodium bisulphide is dissolved in 1 gallon of slightly warm water, the balance of the water is then added and the bath is ready for work. The anodes to be used for this solution should be of electrolytic or soft sheet copper.

For the preparation of the bronze bath the proceeding is the same as outlined above. The bath is made up of:

Ten ounces prepared red copper.

Two ounces carbonate of zinc.

Twenty-seven and one-half ounces carbonate of potassium.

Twenty ounces sodium bisulphide.

Ten gallons water.

The copper and zinc are dissolved together and, as stated before, the procedure in mixing the bath is the same as mentioned in the preparation of the copper bath.

For the production of a good brass solution which will work satisfactorily the method of procedure adopted is the same as for the bronze bath, and the solution consists of the following proportion of chemicals:

Prepared red copper, 10 ounces.

Carbonate of zinc, 5 ounces.

Sodium carbonate, 20 ounces.

Cyanide of potassium, 30 ounces.

Water, 10 gallons.

There is no necessity of using any ammonia or arsenic in this bath. If the articles are to be acid dipped after the deposition of the metal when the bath is used warm and very bright deposits are required, 2 ounces 3 grains of arsenic dissolved in twice the amount of caustic soda may be added to each gallon of the solution.

Old copper or bronze solutions may be very rapidly repaired no matter what they originally may have contained by using 1 part prepared red copper, 2 to 3 parts cyanide and 3 to 4 parts of water. Red copper represents the very best ingredient for the preparation of any of these baths on account of its great purity, its high metallic contents and the rapidity of its work as well as the durability of the deposit.

In making up new potash solutions of at least 40 gallons capacity, better results will be obtained with little or no oxidation of the surface, if one pound of common soap or ½ pound of yellow rosin and 4 oz. of cyanide of potassium is used. This is especially beneficial in cleaning soft metals.

A new enameled ware, the so-called "sterling aluminum," is stated to have been recently put on the market, which is said to be prepared and enameled by a new process.

THE USES OF ALUMINUM.

By G. R. Gibbons.

During its early history, due to a not unnatural enthusiasm, attempts were made to introduce aluminum wherever an opening was offered by its color, lightness or other attractive features. Its failure to meet many difficult and in some cases entirely unreasonable requirements gave rise to a skepticism regarding its practicality as a commercial metal which was for a time an obstacle to the recognition of the real merits of the new metal. In recent years, however, the possibilities for its use have been so thoroughly and conservatively exploited that the ideas created by the early ill-advised attempts have given place to a very accurate knowledge of its position and value among commercial metals.

The uses of aluminum may be roughly divided into five classes:

1. A class based upon the relation between its strength and specific gravity.
2. A class based upon its chemical characteristics.
3. A class dependent upon its color.
4. A class which is the outcome of its electrical qualities.
5. A class constituted of those miscellaneous uses created by its possession either of some distinctive feature or of a combination of commendatory mechanical qualities.

It will be understood that so wide a catalogue of uses as those covered by aluminum cannot be strictly classified, and its use in any place is due largely to the several properties which characterize the metal and to its cheapness compared with other metals of similar rank.

Cast aluminum has a tensile strength of from fifteen to twenty-five thousand pounds per square inch; wrought aluminum, from twenty-two to thirty thousand pounds. Copper is three and a third, brass three and a fifth, and steel two and seven-eighth times heavier than aluminum; therefore an equal weight of aluminum is stronger than brass or copper and almost equal to steel. These facts briefly account for the existence of the first class mentioned, and explain its adoption by a large number of manufacturers, in some cases even at considerable increase in expense. A striking example and one of considerable magnitude is its use for automobile parts: bodies, panels, hoods, castings, radiators and fans; in fact, it is all but essential to the construction of the better machines.

Another use consuming considerable aluminum is the manufacture of metal patterns for foundry work. Lightness, strength and cheapness would render aluminum a model material for this purpose were it not for the difficulties of soldering the cast metal, and this alone probably prevents its replacing the heavy metals now used. Sheet aluminum is also employed for the same reasons as pattern plates in plate casting, upon which both brass and aluminum patterns may be fastened. Cast aluminum finds frequent use for society emblems, the advantages consisting in its attractiveness and especially the ease of carrying otherwise heavy articles. The same reasons obtain in reference to many models and samples, the inconvenience of handling which is greatly reduced by making them of this light metal.

Ranking low in the scale of hardness, aluminum will not spark under any ordinary abrasion. This fact, coupled with its lightness, caused its wide introduction for powder plates, where it has largely replaced copper, practically becoming the standard plate. Similarly, it is found in many places where a light durable plate is required, even in some instances replacing wood. A few examples are: sticking up or transfer plates in lithography; plates upon which to spread the gelatine employed in collotype work; die plates for supporting the dies of embossing machines; cauls for veneering wood, ivory, etc.; press plates for bookbinders, used in substitution for cherry wood boards, and trays upon which to spread clipped fur in the manufacture of hats.

Owing to its lightness, strength and attractiveness, the musical trade looks favorably upon aluminum. Evidence of this is seen in aluminum snare and kettle drum shells, also in xylophone bars and small bells, where its resonance is conspicuous. More extensive is its use among piano player and organ makers. Here it is found as piano key pins, molding, tops, bushings and action parts; piano player fingers and air tubes; organ slides, blowers and valve rings, and in several other places where its peculiar qualities adapt it to the delicate mechanism of such instruments. Somewhat analogous is its utilization for typewriter and adding machine key levers, where its lightness gives ease of action with greater strength than wood. In these machines, however, it is employed elsewhere as well, as in platen cores, frames and sundry parts for which it is well suited.

In many articles a light rigid case or frame is essential, and no material so well as aluminum satisfies this demand. A very typical illustration is the kodak or small camera case so frequently made of aluminum covered with leather. The better grade of eye glass case is similarly made. In the same connection occur sample cases of several kinds, suit case frames, trunk linings, etc. Many other articles might be mentioned under this very large first class, but suffice it to refer to some of the more commonplace, such as cast ledger backs, spirit level frames, graphophone parts, pans in the manufacture of stearin, shipping receipt binders, scale parts, darbies and hawks for plasterers, and blocks for forming hats. A few uses of especial interest as being unusual might also be mentioned, such as artificial limbs, bowling balls, bench marks, saddle trees, horseshoes, embalming table covers, dowels for tombstones, pans for washing gold, mailing tubes, torpedo strips in substitution for lead, and fishing reels.

(*To be continued.*)

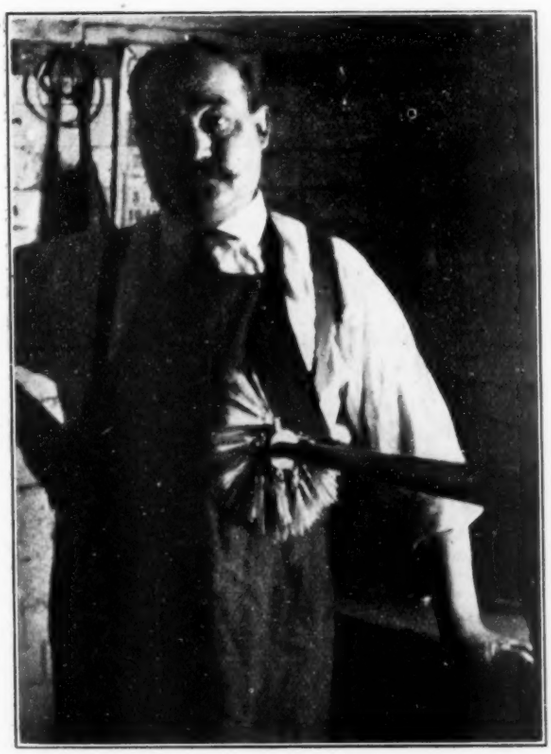
THERMIT PRACTICE IN AMERICA.

In a recent lecture held before the Franklin Institute by Mr. E. Stuetz, the Vice-President of the Goldschmidt Thermit Company, New York City, some interesting information was given concerning the application of thermit for all kinds of welding purposes. The use of Thermit for effecting all kinds of difficult welds for the repair of castings has largely increased within recent years. The Thermit process furnishes a ready means for repairing damages to or defects in castings without interfering in any way with the possibility of machining the casting or diminishing its strength. Mr. Stuetz quoted a number of instances where such welds have been successfully accomplished.

The Government of the Dominion of Canada is reported to have appropriated $15,000 for making experiments with the electric process of smelting ores and manufacturing steel in Saulte St. Marie. The Consolidated Lake Superior Power Co. will furnish a building and dynamo capable of supplying 400 electrical horse power for four months free of charge.

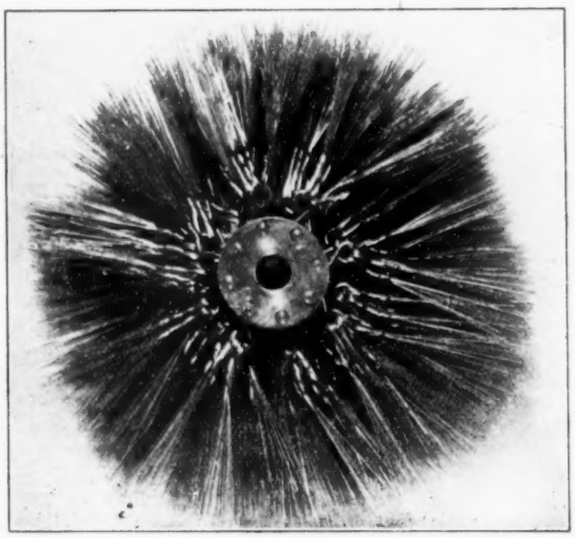
SATIN FINISHING.

During the past few years there has been a great improvement made in satin finishing. The credit for this is due to Mr. William R. Davies, of Meriden, Conn. The old method of using a steel wire brush cut



SATIN FINISHING WHEEL AT REST.

perfectly even and running at a high rate of speed required the finishing to be done with a fine brass brush. The necessity for doing this is done away with in Mr. Davies' method. The brush as made by him

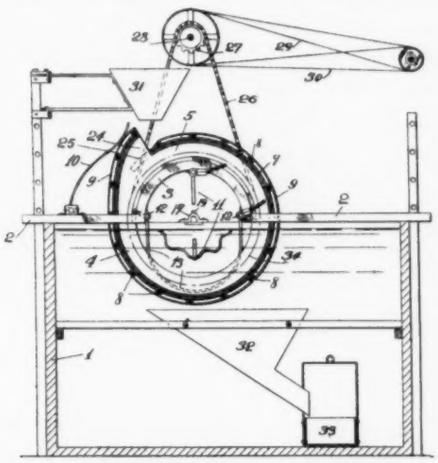


THE WHEEL.

and as shown in the adjoining figure shows that the ends of the wire brush are of a different length. As the brush strikes the work with this irregular action it causes the satin finish to come out more even and quicker. It is not necessary to use brass brushes to finish with. With this process it is possible to satin finish work made up with handles and trimmings in it, inasmuch as the brush is easily forced into small corners and under the handles.

APPARATUS FOR ELECTROPLATING SMALL ARTICLES IN QUANTITIES.

The accompanying illustration shows a recently designed apparatus which has been patented with U. S. Patent 806,835, of December 12, 1905, by Mr. L. Potthoff, manager U. S. Electro-Galvanizing Company, of Brooklyn, N. Y. The apparatus consists of a tank 1 which is lined with a suitable acid-resisting material. Bearing rings 3 are mounted upon cross bars 2, which rings support the tumbling barrel 4. The barrel is provided with a porous or meshed lining such as heavy cocoa matting. It is claimed that even though the work is in contact with the matting the passage of the depositing metal is not interfered with on account of the continual movement of the work and the loose texture of the matting. It is therefore possible to provide the apparatus with both inside and outside anodes. The construction



ELECTRO PLATING APPARATUS.

shown in the figure has an outside anode 9 made in the form of a sheet. The inside anode 11 may be supported from the annular bearing rings 3 and connected with the positive current terminals. The cathode terminal is constituted of one or more longitudinal bars 12 connected by curved cross bars 13. It it claimed that as the barrel rotates the bars 13 will act in a manner as to have a separating effect upon the work and to prevent it from sticking together by the reason of the metal which is being deposited upon it. All parts of the work are thereby exposed to the action of the current and covered with the deposit. Other modifications of the apparatus include constructions in which the use of sliding contacts is avoided and in which the cathode terminals are arranged in a different manner.

The acid dipping jars used in plating establishments as well as the jars for the various dips and pickles should be arranged in a large wooden tank of shallow depth, the size of which would have to depend upon the amount of work to be done.

Iron, zinc, nickel and cobalt occur only in such minute quantities in refined lead that their influence on its physical properties is unimportant.

A NEW AUTOMATIC SPINNING LATHE.

This is an age of automatic machinery and the patent publications continually record new automatic tools which have for their object the manufacture of various goods with the least possible hand labor.

THE METAL INDUSTRY has shown a number of these automatic tools for working brass and the non-ferrous metals, and in the December issue illustrated and described a new automatic turret lathe for finishing brass castings. In the accompanying cut we show an automatic spinning lathe which is both new and interesting. It is of particular interest because it is expected to again bring the spinning lathe into the importance which it possessed before

THE LATHE.

the advent of the drawing press. The commercial advantages claimed for it are that it will do the work of ten to fifteen spinners, can even be operated by a girl, and that goods can be made for 35 cents per gross which if spun up by hand labor would cost $12 to $15 per gross.

The machine has been perfected and in operation for the past year at the factory of the Kronheimer & Oldenbusch Company, Brooklyn, N. Y., who are themselves manufacturers of gold and silver plated novelties and various goods in brass, copper and britannia metal. Being metal goods manufacturers themselves, they make the above claims for the machine based upon the results of their own practical experience. The lathe is the invention of E. Oldenbusch, vice-president of the company, and the attachments for it were made at the company's factory. The frame and gearing of the machine were built by the Waterbury Farrel Foundry & Machine Company, of Waterbury, Conn. When marketed the machines will probably be leased. At present the articles are spun in the lathe from partly drawn shells and later on it is the intention, when the machine is perfected, to make the articles from the blank direct. The hard, non-ferrous metals, such as brass and copper, require less annealing than with a hand lathe. The following is a description of how the operation is accomplished mechanically:

The shell to be subjected to the spinning operation is placed upon a mandrel and the back support is adjusted in position against the end of the shell. The tail-stock is then clamped into position in the usual way by means of the handle. The driving pulley is started and the mandrel and the shell are rapidly rotated. Another driving pulley is then started which rapidly rotates the spinning tool. The latter is brought gently but with increasing pressure against the revolving shell, thus pressing and drawing the metal gradually but with great rapidity to the desired shape. When this is done the finishing roll is held against the spun shell momentarily, the surplus metal is cut away from the open end of the shell and the latter

SPECIMENS OF WORK.

is removed in a completed condition from the mandrel. Another shell is then placed upon the mandrel and the operation is repeated as before.

SLY FOUNDRY EQUIPMENT.

The W. W. Sly Manufacturing Company, of Cleveland, O., manufacture a number of special equipments for foundry use. Among their specialties is a brass cinder mill which is made in one size at present and is mounted on a tank of 3-inch plank, 8 feet by 40 inches by 18 inches deep, strongly bolted together. It grinds and washes at the same time. The metal is retained in the mill and the dirt is washed out. The mill is furnished complete with pump and tank.

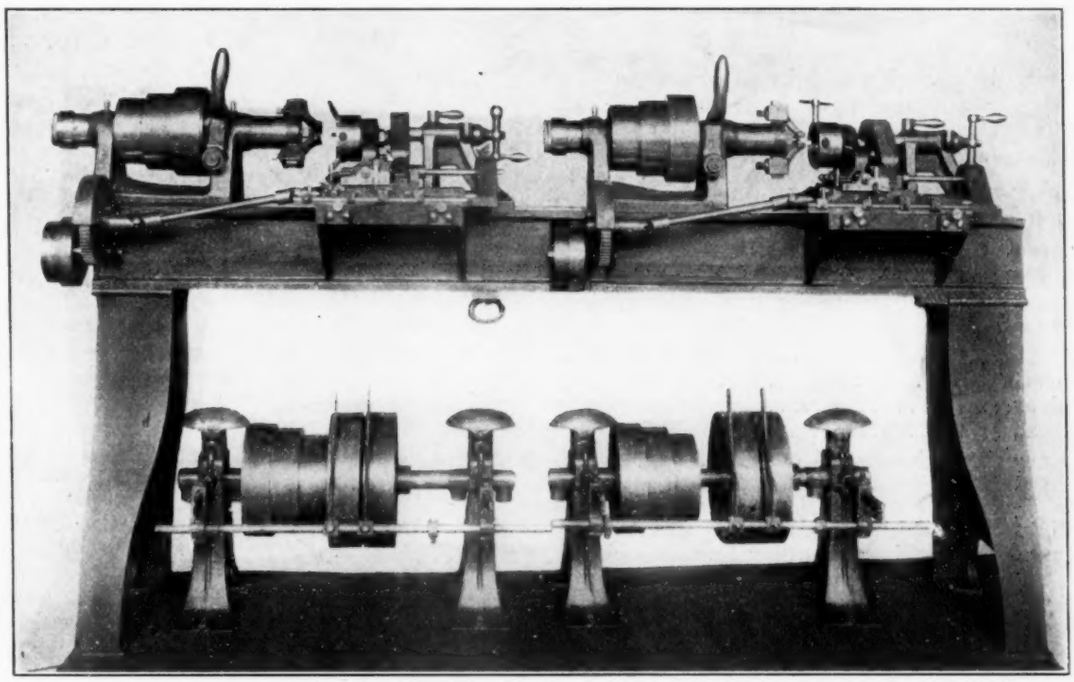
Another one of the firm's specialties is an automatic resin grinder, which is built in two sizes and grinds and bolts two barrels of resin per day. The mill is provided with a bin in which resin flour is deposited and from which it may be taken as required for use. The firm further manufactures a special type of dust arrester, which consists of a steel case or room ten feet high, 8 feet

wide and of the required length to give the necessary capacity. A battery of screens are arranged inside through which the dust cannot pass. The air loaded with dust from tumbling mills, emery wheels or other machinery enters the chamber at the right and the air is drawn out by a fan on the other side in a purified condition.

The firm have just moved into a new building which is of a steel and concrete structure throughout and is entirely fire proof. The first story is occupied by the machine shop and the steel working shop. The second story contains the offices, the dust arrester department, the pattern and wood working department and a pattern vault.

NEW TWELVE-INCH DOUBLE-HEAD KEY LATHE.

The following illustration shows a new lathe which has been carefully designed for the purpose of turning keys for steam, gas and water cocks up to 1½ inches, the greatest distance between centers being 9 inches. This machine is fitted with a vertical turret carrying three tools which automatically perform the three operations of roughing cut, necking or shoulder cut and finish cut. The tool slide has a lateral movement of 5 inches, also a screw cross feed and swivel adjustment for turning any taper up to 2 inches.



DOUBLE-HEAD KEY LATHE.

The largest diameter of machine cone is 8 inches and is fitted with a friction head to facilitate the starting and stopping of the lathe to change work. Two countershafts are furnished with each machine, having 12-inch tight and loose pulleys for a 2¼-inch belt. They should run at a speed of 400 revolutions per minute. The floor space required by the machine is 2 feet 6 inches by 7 feet 6 inches. Its weight is 1,100 pounds. The lathe is made by The Turner Machine Company, 2,049 North Second Street, Philadelphia, Pa.

The Foster-Kimball Machine Company, builders of turret lathes and automatic machinery at Elkhart, Ind., say that they now have about $10,000 worth of business at hand and are running their shop at full capacity with 100 men.

SEPARATING GALVANOPLASTIC DEPOSITS FROM METAL MATRICES.

The ordinary method of detaching galvanoplastic deposits from metal matrices consist in coating the surface of the matrix with a substance such as silver or graphite before the deposit is made, so that the latter can be easily separated from the matrix. A new process which has recently been invented by Eugene Albert, of Munich, Germany, aims at producing this result in a different manner. The inventor heats the matrices from which the deposit is to be separated within certain definite limits of temperature. The process is carried out by plunging the matrices into contact with a metallic bath. This bath should have a considerably lower fusion point than that of the metal of the matrix and it should be heated almost up to the fusion point of the latter. Thus when the matrix with the deposit on it comes in contact with the bath it will be suddenly heated and the deposit will be caused to spring off from the matrix. By this method it is claimed that the deposit can be conveniently removed from the matrix and that the latter can be used over again.

For use in the art of electrotyping where copper deposits are obtained and where a lead matrix is formed the metallic bath above referred to may be constituted by the ordinary backing metal employed in electrotyping. This latter fuses at 250 degrees centigrade. An alloy may also be used which consists of 57 parts of lead and 33 parts of tin and has a melting point of 150 degrees centigrade. It is claimed that by this process the separating takes place easily and that the metal matrix is uninjured.

The Chicago Pneumatic Tool Company has been awarded the gold medal, the highest award for pneumatic tools and appliances, at Liège, and the silver medal for their Franklin air compressors. The company has been awarded the highest honors at all exhibitions since their first exhibit at the Cotton States' Exhibition at Atlanta, Ga., 1895, and has received several diplomas from the Franklin Institute, Philadelphia.

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York.

METALLURGICAL.

Q.—Can you give me a mixture for valves which are to be used in sulphite work? I have been using a formula made up of 90% copper and 10% phosphor tin. This mixture is hard to machine, and I am looking for one that will machine easier.

A.—A formula that is extensively used for the manufacture of valves and fittings for paper mill use consists of the following proportions:

Copper	10 pounds.
Lead	2 pounds.
Tin	¾ pound.
5% phosphor tin	½ pound.

The copper should be melted on the charcoal and the lead should then be added. After that the tin should be put in and the phosphor tin last of all. The mixture should be stirred thoroughly and the pouring should be done at a low heat. Owing to the large amount of lead present this metal is liable to sweat out if too much heat is used.

Q.—Kindly inform me how much phosphorus is contained in phosphor-tin, and give me a good alloy of phosphor-bronze, using phosphor-tin.

A.—Commercial phosphor-tin contains 1¼ to 3¼% of phosphorus. A mixture which is very frequently used in engineering work is as follows:

Copper	86.47%
Tin	9.59%
Lead	3.43%
Phosphorus	.51%

The mixture should be figured out so that the above quantity of phosphorus is gotten into the metal.

Q.—We beg to ask the most satisfactory method you can recommend for testing the proper heat in melting Sterling silver. Is the pyrometer more suitable than the old-fashioned way of inserting an iron or steel bar? Does not the use of a steel bar leave small particles of iron or steel in the silver plate which it is difficult to remove?

A.—In our estimation the pyrometer is the only satisfactory method of ascertaining the proper heat in melting Sterling silver. The old-fashioned method of inserting an iron or steel bar as a test is obsolete in view of the more scientific modern method, although this method is still in vogue by some smelters. There is no doubt that minute particles of iron or steel become imbedded in the silver by this method which have a detrimental influence on the dies or rolls when the metal is worked.

Q.—I send you under separate cover a small sample of rolled brass, the color of which I desire to match in some sand casting. There is, however, a peculiar shade to the metal which I do not seem to be able to get. What composition do you think the piece is made of, and what is it that gives that peculiar shade to the fracture?

A.—The sample of brass plate submitted for inspection is rather an alloy of red brass and probably contains tin and lead. The brass color noted on the surface develops when immersed in the bright acid dip, denoting that in zinc proportion the sample approaches brass, but when polished on the buffing wheel the color approaches low brass. An alloy that will probably match the color of the sample should consist of:

Copper	72 parts.
Zinc	25 parts.
Tin	1 part.
Lead	2 parts.

The alloy should be poured at a low temperature and the metals should be thoroughly mixed.

Q.—I would like to cast paraffine or wax in brass or wood moulds. I should like to know what will prevent the wax from sticking to the metal or wood. I have coated a box with shellac and then oiled it, but even that did very little good.

A.—Take about half water and half silicate of sodium and apply it to the mould with a brush. Let it get thoroughly dry before pouring the wax.

PLATING AND FINISHING.

Q.—Kindly give me a recipe for green verde antique dip for brass. I have used the sulphate of copper and sal ammoniac solution, but it does not seem to be just the right thing, as it seems to rub off.

A.—A sulphate of copper and sal ammoniac dip for verde antique greens on brass gives excellent results if the articles are immersed and dried two or three times. However, a transparent lacquer should be used as a binder for the color. Such a lacquer is preferably made from amyl acetate collodion containing about 6 oz. of gun cotton to the gallon. This is reduced about one-half with a mixture of equal parts of amyl acetate and fusel oil. The solution is used as a dip and does not add any lustre to the green while it preserves it. After lacquering and in order to soften the lustre of the green a plater's hand brush and beeswax should be used. The brush is passed over the beeswax several times and the article is slightly brushed. Any transparent collodion lacquer may be used in the place of the formula given above. Another verde green which produces excellent results is made up from copper nitrate 5 oz., calcium chloride 5 oz., sal ammoniac 5 oz. and water one gallon. After a satisfactory result is produced the articles should be dried and lacquered as outlined above.

Q.—My work after plating in the silver solution has a bluish tint, whereas I want it to be snowy white. The anodes show that the tubs are evenly balanced in silver and cyanide. Please advise me what to do.

A.—We should say that your silver solution is in an excellent condition when it gives a bluish tint with a sufficiently heavy deposit. If it is desirable for you to have a dead white appearance it will be necessary to reduce the quantity of free cyanide in your solution somewhat by the addition of more chloride of silver. This gives better results for dead white silver surfaces than silver precipitated from cyanide. Another method which you might try consists in adding 26 per cent. ammonia water to your solution in the proportion of 6 to 8 oz. to each 100 gallons of solution. It will be better to experiment first with 5 or 10 gallons of solution, but the ammonia will do no harm to the solution.

Q.—I noticed in the October number of THE METAL INDUSTRY a steel plating solution composed of 5½ ounces sulphate of iron, 3½ ounces ammonium citrate, 13½ ounces ammonium chloride, to one gallon of water. Can this solution be used in making antique brass finishes, and, if so, what amount of current should be employed? I

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York.

saw a solution for coloring any kind of metal a gray black, but it was colorless itself. It was used with current and colored brass at once.

A.—The iron or steel plating solution mentioned in the October number of THE METAL INDUSTRY would not prove satisfactory for coloring brass goods. The solution you have reference to is probably made up by dissolving 1 pound white arsenic and ½ pound caustic soda in ½ gallon of warm water. One pound of cyanide of potassium is dissolved in 1½ gallons of warm water, and the two solutions are mixed together. A little sulphate of copper may be added and nickel anodes should be used for this solution. It requires an unusually strong current at no less than 4 volts pressure.

One of the best solutions for coloring brass and copper by electric deposition is made up as follows: Dissolve ½ pound white arsenic and 1 pound caustic soda in 1 pint of hot water. Dissolve 4 ounces of single sulphate of nickel in another pint of water, and mix the two solutions together, then add the solution thus obtained to ¾ gallon of commercial hydrochloric acid. Nickel anodes should be used for this purpose and a good current at 4 volts pressure. The work must be as clean as for nickel plating work. On polished work a beautiful bright black is obtained in one-half minute. On dipped work a gun metal finish is produced.

Q.—Kindly inform me how I can produce a Bower-Barff finish on brass or copper goods which will have lasting qualities? I have tried the following, but it does not permit much handling. I matted the article, which was a brass door knob, and then gave it a good coating of copper. I then matted it again and oxidized it with potassium sulphide as platinum is too expensive. I then lacquered it with a good lacquer, to which I added some lampblack. The result was good, but it would not last.

A.—The best imitation of the Bower-Barff finish is produced by slightly coppering and oxidizing the article. A dead black lacquer is then applied, and when the lacquer is thoroughly dried and hard, the article is sand blasted.

Another method which is used by manufacturers of builders' hardware consists of coppering the article and then oxidizing it in a weak solution of sulphide of potassium, preferably the German sulphide. To this solution a small amount of ammonia is added in order to produce a dead black. The article is afterwards lacquered with a heavy body collodion lacquer and when dried it is sand blasted. The majority of Bower-Barff finishes found on brass and copper goods, as well as iron, are the usual copper oxidized and dead black lacquer.

Q.—Is there any method of producing verde antique finish, bright and smooth like a nickel surface? I have tried lacquer to which copper carbonate was added, but it did not fill the requirements.

A.—A verde antique finish should not shine like nickel plate, as that would spoil the desired effect of age. A satisfactory method that can be used consists in dissolving ½ ounce acetic acid, ½ ounce sal ammoniac, in 1 pint of water. A sash tool is moistened with this solution very slightly and the end is dipped in dry carbonate of copper. The articles are then stippled lightly all over with this and are then dried in the heater. They are afterwards lacquered with a heavy collodion lacquer. When dry they are polished with a soft platers' hand brush and bees' wax. The metallic surface required for this purpose should be a dead or slightly oxidized surface in order to give the effect of age.

Q.—What is meant by nickel typing?

A.—Nickel typing is a method of facing electrotypes with nickel in order to produce a harder surface than that of the usual copper deposit. Nickel is not affected as readily as copper and gives better results.

Q.—Kindly inform me how to harden felt wheels. I have some which are too soft for polishing purposes.

A.—Felt wheels when too soft for use may be hardened by coating them thoroughly with a liquid glue made as follows:

Best white glue, 16 ounces.
Dry white lead, 4 ounces.
Water, 2 pints.
Wood alcohol, 4 ounces.

The alcohol should be added last. The wheels should be allowed to take up quite a lot of this mixture by applying it to both sides, and they should afterwards be thoroughly dried before they are used.

Q.—Please inform us what kind of preparation we can use to stop off the plating on parts of articles which are plated in the following solutions: Gold, silver, nickel, brass and copper. We would like to have some preparation which we can use for partially plating different metals or for plating the same object with two or more metals.

A.—A satisfactory stopping-off varnish may be made by using common air drying Japan thinned with benzol. This varnish is to be applied with a camels' hair brush as thinly as possible. If the article is warmed the varnish will set more rapidly. The article should then be dried on a heater for a short time and should afterwards be immersed in cold water, when the coating will be sufficiently hard. Benzine or naphtha should be used for removing the varnish.

Q.—Will you kindly inform me of a good stripping solution for silver plating work? I have had a great deal of trouble in stripping nickel spoons and forks. These goods are heavily silver plated, and in some places it is hardly possible to get the silver off with a buff. My strip, which consists of nitric and sulphuric acid, seems to damage the goods before the silver is off.

A.—An acid strip is the only successful method of removing the old silver from German silver or nickel spoons unless a mechanical method is used. A good strip should consist of 1 gallon of sulphuric acid and 6 ounces of nitric acid. This mixture should be used warm, but care must be taken not to get any water into the stripping solution, as it will attack the base metal if this should occur. The solution should be kept tightly covered when not in use, and the goods should be thoroughly dry when they are immersed in it.

Q.—Please inform me what is the cause of enameled jewelry chipping when it is electroplated? Is it the heat of the cyanide bath, or is it due to the current? Other people seem to plate such goods successfully, but we have trouble with it chipping in the solution.

A.—The chipping or cracking of the enamel referred to is probably caused by the expansion of the metal in the hot solution or the contraction of the enamel when the goods are washed in cold water. The enamel is of a vitreous nature, and the alteration caused by the heat and the cold may cause it to crack. This sometimes occurs with glass when it is placed in hot water and then suddenly plunged into cold water. The best procedure in this case seems to be to raise the temperature of the wash water, which will probably overcome the difficulty.

CORRESPONDENCE DEPARTMENT

Correspondence is solicited from all of our readers on subjects relating to the smelting, refining, founding, finishing, rolling, drawing, stamping, spinning, plating and polishing of all of the non-ferrous metals and alloys. Name and address must be given, though not necessarily for publication. Address THE METAL INDUSTRY, 61 Beekman Street, New York.

FELT WHEELS.

To the Editor of THE METAL INDUSTRY:

The solid felt wheel business is in an ugly shape to-day owing to unwise competition and lowering of prices, which has made it impossible for felt makers to preserve the uniform standard of quality. This is resulting in an increased cost to the users of felt wheels. The majority of felt wheels sold to-day at the prevailing prices are compressed and not felted. As a result the wheel is hard and soft in spots, and it is therefore prevented from running true, wears away and only lasts a comparatively short time. The greatest benefit to the user can only be derived by buying standard first-class goods, as they are by far the cheapest in producing work. We have found that a felt wheel made in compressed form is more satisfactory than the solid felt wheel, as it permits the density of the wheel to be varied to suit working conditions, and the felt surface of the wheel is absolutely uniform in texture as the wheels are made from the highest quality of felted sheet.

The polishing room seems to be the one department in a factory which usually receives the least attention, but when polishing wheels are constructed especially for the work that the manufacturers have to do the results are usually astonishing, as far as the economy realized and the quality of work produced is concerned. The days of making buffing wheels of rags and the polishing wheels of any kind of leather, worn out canvas or sail cloth, seem to have passed, and we note with satisfaction the general disposition among metal workers to improve and economize in their buffing and polishing departments.

DEVINE BROTHERS COMPANY.

POWER PRESSES.

To the Editor of THE METAL INDUSTRY:

My attention has been called to the comment of the Ferracute Machine Company which appeared in the December issue of THE METAL INDUSTRY regarding my article on "Power Presses and Their Use for Working Non-Ferrous Metals" in your November issue.

The Ferracute Machine Company do not build toggle presses, and naturally take exception to the statement that "Toggle drawing presses are preferable to cam drawing presses in all cases, even for heavy stock where the blanks have been previously cut or where the metal to be simultaneously cut and drawn is of comparatively light gauge." In explanation of this statement, I wish to say that the "toggle drawing presses" to which reference was made were those built by the E. W. Bliss Company, Brooklyn, N. Y. I am aware of the fact that there are other toggle drawing presses on the market, and it is possibly these to which the Ferracute Machine Company refer.

For a great many years the E. W. Bliss Company has made cam drawing presses of all types, and of proper design in every respect, with wide cams of correct proportions; but I unhesitatingly stand back of the statement quoted above, and this statement is substantiated by many testimonials which they have received from the largest manufacturers of seamless drawn sheet metal goods.

E. S. PORTER.

The Cornell-Andrews company, smelters and refiners, Attleboro, Mass., make a specialty of metals, chemicals, and anodes and sterling silver in all widths and gauges.

WATER LACQUER.

To the Editor of THE METAL INDUSTRY:

I beg to advise you that I tried the water lacquer which was described in the October, 1905, issue of THE METAL INDUSTRY, consisting of 4 ounces imported white gelatine dissolved in one gallon of boiling water. I found, however, that it became sticky in handling, and I therefore experimented with it somewhat. I find that it dried much harder when a small addition of bi-carbonate of soda was made. The same result could be obtained with the addition of a little formaldehyde. The trouble with formaldehyde, however, though it works better than the potash salt, is that it has a disagreeable odor. G. I. ONIONS.

BOOK REVIEW.

THE PRODUCTION OF ALUMINUM AND ITS INDUSTRIAL USE. By Adolphe Minet, translated with additions by Dr. Leonard Waldo. New York. John Wiley & Sons. 1905. 266 pp., with illustrations. Price $2.

The volume is mainly a translation of Mr. Minet's book under the same title which appeared in Germany in 1902. Two appendixes have been added, in the first of which Mr. Minet gives some further data about the electrolysis of baths containing alumina and aluminum fluoride, while the second appendix contains some notes by Dr. Waldo on the history and uses of aluminum with a statistical data. The production of aluminum is treated from the historical standpoint and considerable space is devoted to the author's method of producing aluminum. Some 70 pages are occupied by the description of the properties of aluminum and notes on the working and plating as well as the uses of aluminum. Though the information the book contains on the working of aluminum is somewhat meagre, it will no doubt be useful for such of the readers of THE METAL INDUSTRY as will want to gain general information on the subject of aluminum.

NEW ROLLING MILL.

In the December number of THE METAL INDUSTRY we announced the formation of a new brass and copper rolling mill at Detroit, Mich., particulars of which were unobtainable at the time that our December number went to press. The facts to date are as follows: Thirty-four prominent Detroit business men have signed an agreement to start a new copper and brass rolling mill in Detroit to be called the Michigan Copper and Brass Company, with a capital stock of $1,000,000, of which $500,000 has already been subscribed by the signers of the agreement. The following committee has been appointed to select and present nine names as directors of the new company: M. J. Murphy, George H. Barbour, J. E. Danaher and N. D. Carpenter. This committee will also arrange the details of the permanent organization and meet at the call of the chairman, George H. Barbour. Mr. Barbour in describing the new enterprise said it was not started to injure the Detroit Copper and Brass Rolling Mills, also located at Detroit, but that he believed it would aid in the further development of the industry in Michigan and that both companies will have all they could do. The new company have already purchased from Andrew H. Green, of the Solvay Process Company, a tract of land containing about twelve acres adjoining Fort Wayne on the east, with a frontage of 385 feet on River street and extending back about 1,400 feet to the harbor line of the river. Jeremiah Howe, formerly superintendent of the Detroit Copper and Brass Rolling Mills, is connected with the new company.

Baker and Company, inc., manufacturers of platinum, Newark, N. J., has recently added a second story to their factory and have enlarged their office which is in the same building.

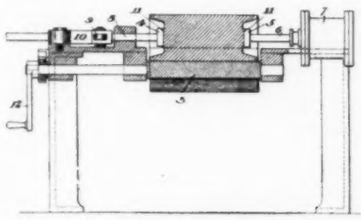
PATENTS

A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York

808,066. December 26th, 1905. Process for the Production of Metallic Calcium. W. Borchers and L. Stockem, Aachen, Germany. The process of producing metallic calcium is carried out by electrolyzing molten calcium chloride. The temperature of the electrolyte at least at and around the cathode is kept at a moderate red heat not exceeding the melting point of calcium metal. An electric smelting apparatus is employed which allows the use of a comparatively small cathode against a large anode. Calcium deposits in the shape of a soft sponge upon the cathode and is removed therefrom by means of a spoon.

808,367. December 26th, 1905. Molding Apparatus. A. M. Hewlett and M. J. Hewlett, Kewanee, Ill. The invention relates to the molding of sand or analogous material for the formation of cores or making molds. It consists essentially of an apparatus which embodies transversally movable means for supporting the mold and the necessary pressure mechanism for carrying the sand into the mold and packing it in the latter. It also comprises means for putting an empty mold into position to be charged while the molded flask is being removed. The only labor required is the removal or insertion of molds or flasks.

805,703. November 28th, 1905. Machine for Stamping Copper. R. Baggley, Pittsburgh, Pa. The object of the machine is to provide means for stamping weights, owners' names, etc., on pigs or plates of copper or other metal. It consists of a table 2 upon which the piece to be stamped is placed. It then rests upon a rotatable supporting block 3, preferably of star shape. When in this position it is directly in line with the dies. One of these dies is carried at the end of the piston 6 of the cylinder 7, and

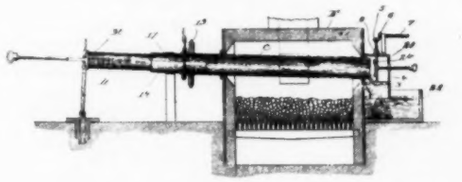


the other die carried by a stem 8 which is movable lengthwise by the lever 9 and backed by the adjusting eccentric stop 10. The endwise movement of the pig is limited by the resistance mechanism 10 so that when the limit is reached the pressure of the die 4 will sink the letters or figures into the plate and the further movement of the piston and die will be prevented. Means are provided for discharging the metal pig which has received an impression.

806,270. December 5th, 1905. Apparatus for Varnishing Sheet Metal Bands. A. Lubbertsmeier, Barmen, Germany. The apparatus consists of a frame which carries a number of rolls on which a thin sheet metal band is wound. In front of the frame is located a bath containing varnish in which bath are journaled a number of rollers. The rollers dip into the varnish and are provided with scrapers. The metal band is guided over the surface of the varnishing rollers and then enters the drying oven through which hot gases from a source of heat are passed. The band travels over a series of rollers in the frame work and provision is made for turning it and carrying it to and fro over the rollers so that the varnished surface is always upwards and cannot be damaged. The band leaves the oven perfectly dry. The operation is continuous.

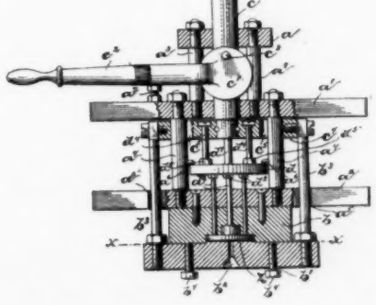
805,969. November 28th, 1905. Separation of Metals. N. V. Hybinette, Westfield, N. J. The apparatus consists essentially of a wooden tank which contains a cathode plate inside of a porous diaphragm, and a number of anodes. In separating copper and nickel there is preferably used an electrolyte consisting of a dilute solution of sulphate of nickel with a small proportion of weak acid such as phosphoric acid, boric acid, lactic acid or other organic acid. The anode consists of the alloy to be separated. The nickel is deposited on the cathode until a sufficiently thick plating has been obtained. The insoluble constituents of the anode, such as platinum, palladium, gold, etc., together with considerable copper, are deposited as a slime on the bottom of the tank. In order to remove the dissolved copper and iron from the liquid which flows from the electrolytic tank it is first heated and then regenerated with nickel by passing it into a vessel in which it is maintained at a boiling temperature and brought into contact with suspended slabs of a nickel and copper alloy containing, say, 30 per cent. of copper. The iron is removed by passing the solution through an electrolytic tank in which it is oxidized, after which it is precipitated in another tank by the nickel carbonate.

826,900. December 12th, 1905. Galvanizing Apparatus. W. A. Leonard, West Wareham, Mass., assignor of one-half to Tremont Nail Co. The apparatus is primarily intended for galvanizing small articles and the discharge arrangements are so constructed that these articles are separated from each other in order to prevent them from adhering together after they are galvanized. The apparatus consists of the furnace F and a container or retort C, which is operated by means of a sprocket



wheel, the charging cylinder D and the vessel 22 which contains water or other cooling medium into which the galvanizing articles are deposited. The separator comprises one or more blades 3, which extend radially from the vertical shaft 4. These blades are made to move across the path of the falling articles as they are discharged from the container. They revolve with sufficient frequency so that each article will be struck by one of the blades. Thus the articles are thrown separately against the side of the casing 20 or into the cooling medium.

807,024. December 12th, 1905. Mold for Making Castings. C. D. Grimes, B. F. Ellerman, T. A. Legler, Jr., Dayton, O. The device consists of a frame work in which a two-part mold is arranged. The drag *b* is rigidly secured to the frame work, while the cope *b* is removably held in position. A plunger *c* is operated by eccentric c^1, which have an operating lever c^2. The apparatus



is so constructed that by operating the lever c^2 the plunger *c* with its head c^4 will be moved inward and this causes the mold to open along the parting line by moving the cope b^1 away from the drag *b* by means of the connecting links b^3 between the cope b^1 and the head c^4. Means are also provided for ejecting the finished casting from the mold.

804,664. Nov. 14, 1905. Soldering Paste. M. Leisel, Cologne, Germany. The soldering paste consists of metals which can be converted into an extremely fine metal powder, particularly for example by reduction into dust by electrolysis or by mechanical means. Such metals are bismuth, tin, lead, zinc, antimony, brass, copper, nickel, aluminum, silver, gold, cobalt, iron, etc., other alloys. To the powdered metal is added a soldering flux such as ammonium, chloride and glycerine. As the latter does not evaporate before the solder is melted, the fine metal powder is protected from oxydation.

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

The Cincinnati Metal Company, Cincinnati, O., have moved to a large five-story building at 602 Walnut street.

The Milwaukee Electric Railway and Light Company has installed a small brass foundry exclusively for their own work.

The Wagner Manufacturing Company, Sidney, O., announce that in the spring they expect to build a new aluminum foundry.

D. H. Roberts, Detroit, Mich., brass goods manufacturer, has acquired two parcels of land and will shortly erect a new plant.

The former American Metal Wheel and Toy Company, Toledo, O., has changed its name to The American Metal Wheel and Auto Company.

L. H. Gilmer and Company, Philadelphia, Pa., are now in their new quarters with increased facilities for the manufacture of their woven light machinery and polishing belts.

Walsh's Sons and Company, Newark, N. J., make a specialty of metal drosses, skimmings, foundry ashes, buffings, filings and other metal residues, "and accord all 'a square deal'."

The Fitch Morency Brass Company, until recently of Detroit, is now located at Sturgis, Mich., and report that they are in good running order and have every promise of a prosperous future.

The Globe Machine and Stamping Company, Cleveland, O., say that their improved oblique tumbling barrel embodies several new features which make it a time-saver and which give it a long life.

The Atlas Metal Manufacturing Company, Irvington, N. J., announce that they are making a specialty of cast soft metal goods of every kind and are prepared to furnish estimates upon such work.

The Consolidated Buckle and Metal Goods Company, New York, report that they are getting splendid results with leather meal for polishing nickel-plated wire buckles by the tumbling barrel process.

The Crescent Phosphorized Metal Company have moved to their new plant at Cambridge, N. J., with offices at 421 North Twenty-second street, Philadelphia, Pa., to which all communications should be sent.

The Ansonia Novelty Company, Ansonia, Conn., has acquired the works and machinery of the Phelps and Bartholemew Clock Company, Ansonia, and will operate the plant in the manufacture of clocks.

The strongest and purest lye sold specially suitable for the use of platers and metal workers is offered to the trade by the United Zinc and Chemical Company, of Chicago. The lye is put up in packages of convenient size.

Bull and Roberts, consulting chemists and metallurgists, at 100 Maiden lane, New York, are taking up the electro-plating and cold galvanizing fields with a view to solving the difficulties of platers and to the establishment of new plants.

At a test recently made with a rapid chucking machine manufactured by W. L. Abate, New York, 400 half-inch pipe ends were finished in one hour and forty minutes, and 1,660 half-inch water bibbs, shanks and nose ends in ten hours.

Richards and Company, Inc., Boston, Mass., report that, notwithstanding the ruling high prices of metals, business is very good. This company says that they now carry the largest stock of sheet copper and galvanized stock in the East, excepting New York.

Dings Electro-Magnetic Separator Company, of Milwaukee, report an increase of business of at least 50 per cent for 1905 over any former year. Their magnetic separators are now considered a standard requirement in every well regulated brass foundry or metal refinery.

The National Motor Boat and Sportsman's Show will be held February 20 to March 8, inclusive, at Madison Square Garden, New York. Already nearly all of the old exhibitors and many new ones have made application for space and the show promises to be the best ever held.

The Milwaukee Aluminum Manufacturing Company, R. E. Sack, manager, is the name of a new concern that has started up business in the old Campbell bell foundry, 163 Barclay street. They make a specialty of heavy aluminum and brass castings for the automobile trade and general job work.

Nicholas J. Murphy is erecting a small brass foundry, 75 x 25, at Fourth avenue and the railroad, Asbury Park, N. J., in which he will manufacture faucets and small brass articles of a similar nature mostly of his own invention. Mr. Murphy reports that he has already written some of our advertisers.

The Kelly Brass Works have purchased the plant of the Illinois Brass Foundry Company, 97-101 Bunker street, Chicago, Ill., and will conduct the business as a jobbing brass foundry at the same address, making large or small castings in aluminum, brass, bronze, phosphor-bronze, copper, German silver, etc.

The Rockwell Engineering Company, 26 Cortlandt street, New York, report that they have received a number of inquiries regarding their annealing and hardening furnace from the brass rolling mills and brass goods manufacturers who find such a furnace particularly suitable for the annealing and hardening of their tools.

Consul Norton, of Smyrna, Turkey, writes in connection with the American Floating Exposition that among the products that would sell well in Turkey are cheap grades of art metal goods, copper in sheets, brass and iron faucets, gold and gold-plated jewelry and novelties in jewelry, metal and silverware, all in cheap, showy grades.

The Wisconsin Brass Company, under the efficient management of C. Lindemar, is becoming one of the principal manufacturing institutions of Port Washington, Wis. The company has made quite a number of improvements lately, and are increasing their equipment by the addition of a Dings magnetic separator and other economic apparatus.

The A. Gilbert and Sons Brass Foundry Company was recently incorporated in St. Louis with a capital stock of $10,000 to manufacture and be jobbers in brass, bronze and aluminum. The incorporators were Alfred Gilbert, Charles F. Gilbert, James A. Gilbert and George W. Gilbert. The company has manufactured the above products for a number of years.

The Monarch Engineering and Manufacturing Company, Baltimore, Md., makers of the Steele-Harvey metal melting and refining furnace, report that they have lately made their first shipment to Japan for a department of that government, and have promises of further orders. The Bullock Electric Company, of Cincinnati, O., have placed orders for three furnaces.

TRADE NEWS

Trade News of Interest Desired from All of our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

The Automobile Club of America will hold its sixth annual national exhibition January 13 to 20, at the Sixty-ninth Regiment Armory, Lexington avenue, between Twenty-fifth and Twenty-sixth streets, New York. At the same time there will be held in Madison Square Garden, New York, an automobile show under the auspices of the Association of Licensed Automobile Manufacturers.

The Hobbs Manufacturing and Stamping Company, New Orleans, La., was recently organized to manufacture a full line of pieced and stamped tinware, steelware, lamps, kitchen utensils, wire goods, copper and brass ware, nickel, copper and silver-plated goods, machinery, tools dies, and a number of other specialties and are now in the market for machinery, tools and other equipment.

The Challingsworth Foundry and Machine Company has been incorporated at Mt. Vernon, O., with a capital stock of $150,000, to engage actively in the making of medium sized brass and bronze castings and especially of castings for heavy bearings. The company will also make a special heavy metal for which a trade name has not yet been determined. Mr. Ben Ames is secretary of the company.

The recent offering for subscription of $3,000,000 in the new preferred stock of the National Lead Company is said to be another step toward the long-discussed combination of the two great lead companies—National and United. The $3,000,000 cash obtained by the sale of the stock will be used as additional working capital and is part of an issue of $10,000,000 common and $10,000 preferred authorized last June.

The Ideal Bronze Company, which has been engaged in business in Cleveland, O., for the last six years, was lately incorporated with $10,000 capital by F. H. Zwilling, F. Deshberg, P. S. Knight, L. Klein, and E. M. Close. The company is at present making extensive arrangements to increase their capacity for the production of heavy and light castings in all grades of bronze, brass and aluminum, with a specialty of automobile work.

Plans are being perfected by S. C. Coddington, of the Modern Steel Structural Company, Waukesha, Wis., for an additional factory building for the Aluminum Manufacturing Company, Two Rivers, Wis., to be erected this spring. The building will be 142x42, two stories in height, and will be made entirely fireproof, being constructed entirely of steel and brick, with metal window frames and reinforced concrete for floors and roof.

The Standard Roller Bearing Company, Philadelphia, Pa., are building a two-story foundry, 60 x 125 feet, to be used for brass and iron castings, but principally for brass, and they are now in the market for a full equipment consisting of stacks or cupolas for gray iron castings, oil burning furnaces for brass castings, molding machines, flasks and other foundry apparatus. During the last month the company purchased machinery aggregating in value $60,000.

The brass district of Connecticut has recently been greatly interested in the acquisition of a large acreage with railroad frontage in Waterville, a suburb of Waterbury, Conn., by the owners of the Chase Rolling Mill Company, brass and copper manufacturers, and, although no authoritative statement has yet been made regarding its disposition, it is generally believed that the brass industry of Waterbury will be greatly enlarged as a result of this property transaction.

The Granby Mining and Smelting Company, St. Louis, Mo., have increased their capacity one-third and fired the new addition January 1. The company reports that the Granby Special Brand of Spelter is manufactured exclusively from high grade zinc ores from the Joplin district, together with their entire output of Granby Silicate, giving a softness and ductility to the metal which is especially desirable in the manufacture of cartridges or wherever a pure, soft metal is required.

The property and plant of the bankrupt M. S. Benedict Manufacturing Company, Syracuse, N. Y., will be sold at public auction at Syracuse, January 22, at 10 A. M. The plant consists of one 200 horse-power Corliss engine, two 75 horse-power boilers, two large electric generators, safes, and the machinery, tools, dies, designs, implements, appliances and plating apparatus; also a quantity of merchandise consisting of hollow and flat silverware, tin spoons and the materials used in the manufacture thereof.

Copper alloys, including silicon-copper, manganese-copper and magnesium-copper; manganese alloys, including manganese-nickel, manganese-tin, manganese-zinc; zinc alloys, nickel alloys, including manganin metal which is an alloy of nickel, manganese and copper, arsenic-nickel and copper-nickel, magnesium metal, manganese metal and also cadmium, bismuth and other rare metals and alloys may be obtained from C. W. Leavitt & Co., 15 Cortlandt street, New York City, who makes a specialty of selling these metallic products.

National Sheet Metal Company, Peru, Ill., makers of plated sheet metals, report that their goods are used for a variety of articles, such as signs, novelties and articles for stamping. These articles can be stamped from the plated sheets, and thus there is saved the labor of plating after stamping, a little polishing only being needed. This kind of plating, the company says, was originated a few years ago by the company's superintendent, Mr. Henry Schussler, and the last two years' output has been 600,000 in 1904, and 1,000,000 pounds in 1905.

Messrs. Robert Ryon and A. Ward Evans have purchased the business known as the Syracuse Plating Works, with factory and office at 312 East Water street, Syracuse, N. Y. The plant has been in operation ten years, and the new proprietors intend to enlarge it as rapidly as possible and to make a special effort to interest manufacturers of machine parts, small forgings and castings and metal novelties of all kinds. The firm is prepared to do plating of gold, silver, nickel, brass, bronze and copper, oxidizing and refinishing and lacquering. The Syracuse Silver Shop, a department of the company, manufacture all kinds of plated table silver.

The Buffalo Aluminum Company are now settled in their factory at 565 Washington street, Buffalo, N. Y., where they have a nicely lighted loft containing 7,500 square feet of floor space. The company is the outgrowth of the International Aluminum Company of Buffalo and the Childs Aluminum Company of Providence, R. I., both of which were bought by the Buffalo Aluminum Company. The company are still putting in additional machinery especially for working sheet metals and intend to branch out into brass goods. At present they are doing a good business in aluminum novelties. W. L. Luttringhaus, formerly manager of the New Jersey Aluminum Company, is in charge.

Among the proposals issued by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., for supplies and machinery, the following should prove of interest to our readers: Schedule 304, bids opened January 16—hardware and tools, lathe; Schedule 305, bids opened January 16—manganese bronze, ingot copper, pig tin; Schedule 306, bids opened January 16—Muntz metal; Schedule 307, bids opened January 16—ingot copper, galvanized sheet steel, brass pipe, valves; Schedule 311, bids opened January 23—brass pipe and fittings, valves. Bids for sale of old material including fire brick, hand and machine tools, boilers, scrap metal, etc., will be opened January 17 at the Boston Navy Yard, where the material now lies. Further particulars and blanks may be had from the Bureau.

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

NEW CATALOGUES

"Le Chatelier's Pyrometer" is the title of a catalogue issued by Charles Engelhard, American representative, 41 Cortlandt street, New York. The pyrometer is an instrument for measuring temperatures up to 2920° Fahrenheit, and beside describing the instrument in detail the catalogue presents interesting data covering the melting points of metals, etc. A leaflet issued gives a partial list of 260 users of the pyrometer, including Scovill Manufacturing Company, Waterbury, Conn.; Osaka Copper Company, Japan; the Coe Brass Company, Torrington, Ct.; Detroit Copper and Brass Rolling Mills, Detroit, Mich.; Matthiessen and Hegeler Zinc Company, La Salle, Ill.; Illinois Zinc Company, Peru, Ill.; Prime Western Spelter Company, Gas, Kan.; the Lanyon Zinc Company, La Harpe, Kan., and the New Jersey Zinc Company, Newark, N. J.

The American Railway Supply Company, 24 Park place, New York, have issued a pamphlet on time checks, entitled "Time Checks and Their Uses."

Chas. T. Burlin, Whitinsville, Mass., is sending out a folder descriptive of his Magnetic Metal Separator. Prices and a list of recent sales are also added.

Zeh and Hahnemann, Newark, N. J., have issued a folder illustrating and describing their soldering machine and some new and standard designs in Power Presses.

The supply department of Patterson, Gottfried and Hunter, New York, have issued a 12-page list of tools for the "Automobilist, Carpenter, Machinist, or Mechanically Inclined."

A 44-page illustrated catalogue of Twentieth Century Foundry Equipment, presenting a full line of foundry appliances, has been issued by J. Gilmour, Nassau and Fulton streets, New York.

The Falcon Bronze Company, Youngstown, O., manufacturers of bronze and brass castings for every kind of machinery, have issued a 32-page catalogue illustrating and describing their plant and products.

John Hassall, Brooklyn, N. Y., has issued an illustrated price list of brass, copper, iron and German silver rivets and escutcheon pins which are especially adapted to the use of manufacturers of sheet metal goods.

"Screw and Turret Machinery" is the title of an attractive 36-page illustrated catalogue of the Dreses Machine Tool Company, Cincinnati, O. A fine looking line of turret lathes which are "especially adapted for making brass goods by special tools" is included.

The Baird Machine Company, Oakville, Conn., are circulating a folder illustrating a few points on visble tumblng. Their catalogue "C," recently issued, deals more fully with tumbling barrels, catalogue "A" with special machinery, and catalogue "B" with power presses.

The Watson-Stillman Company, makers of hydraulic machinery, tools and supplies, at 46 Dey street, New York, are sending out third edition copies of sheets 325, 326 and 329, descriptive, respectively, of "one-piece frame," "movable cylinder" and "movable ram" coupling bolt forcer.

ASSOCIATIONS

The Metal Trades Associations of Chicago, Cleveland, Cincinnati, Boston, Buffalo, St. Louis and probably New York have amalgamated with the National Organization in order to be prepared to maintain the principle of the open shop. The National Metal Trades Association in its new form will have a membership of from 5,000 to 6,000 employers, representing a capitalization of $1,000,000,000 and employing 350,000 men. W. J. Gardiner, of Quincy, Ill., is President of the National Association.

The Connecticut Valley Metal Trades Association recently held a meeting at Springfield, Mass., F. C. Breakspear of the A. G. Spaulding & Bro. Manufacturing Company of Chicopee, Mass., presiding, and H. W. True, gas engineer of the Barbour, Stockwell Manufacturing Company of Cambridgeport, Mass., being the speaker of the evening. A. F. Bassett, of Springfield, secretary of the Connecticut Valley Labor Bureau, outlined the purpose of the bureau and spoke of its value to workmen and employers. A large number attended.

MEETINGS

At a meeting held December 8, 1905, at Rome, N. Y., the following changes were made in the Board of Directors of the Wire & Telephone Company of America: J. S. Dyett, of Rome, president, to succeed C. F. M. Niles, of Toledo, O.; Oliver Shiras, of Rome, vice-president, to succeed J. S. Dyett; S. H. P. Pell, of Pell & Company, New York, director.

At the Hollenden Hotel, Cleveland, O., December 11 and 12, the Brass Manufacturers of the United States held their annual meeting, which proved to be one of the most successful in the history of the association. Owing to the high prices of raw materials an advance in prices of 10 per cent was deemed advisable. The following were elected to membership: Hoffman & Billings Manufacturing Company, Milwaukee, Wis.; Clum & Atkinson, Rochester, N. Y.; P. Healey, Evansville, Ind.

The following officers were elected for the ensuing year: President, E. C. Regester, Baltimore, Md.; trustees, A. S. Hills, Haydenville, Mass.; F. K. Dibley, Milwaukee, Wis.; W. D. McRea, Detroit, Mich.; Theo. Ahrens, Jr., Louisville, Ky.; W. G. Radcliffe, Cleveland, O.; Wm. Troy, St. Louis, Mo.

The society adjourned to meet in Washington, D. C., in February.

PERSONALS

John Coley, of Bridgeport, Conn., has been appointed superintendent of the Cheshire Brass Company, Cheshire, Conn.

C. S. Powell, general agent of the Westinghouse Electric and Manufacturing Company, has moved his offices to the Trinity Building, 111 Broadway, New York.

John B. Freysinger, connected with Sargent & Company, New Haven, Conn., in various mechanical capacities in the manufacture of builders' hardware, for over seventeen years, has severed his connection with that firm.

Mr. C. M. Dally, of New York, has been appointed as representative of the builders of the Bates & Peard patent annealing furnace, of Hayton, Liverpool, England. The builders have just installed a furnace complete in the Dominion Wire Company of Canada and hope before very long to get the first furnace for wire into the United States. The new illustrated catalogue of the Bates & Peard people, which shows a great variety of annealing furnaces, was described in the December, 1905, number of THE METAL INDUSTRY, and the process, with illustrations, in THE METAL INDUSTRY of July, 1904.

METAL MARKET REVIEW

NEW YORK, January 10, 1906.

COPPER.—The domestic copper market at the close of the year is as strong or stronger than at any other period and prices have touched the highest point in years. It does not seem possible or probable that prices will continue to advance. There must come a time when these abnormally high prices will affect consumption and give producers a chance to catch up to the late enormous consumption. The year 1905 will stand pre-eminently as a metal year. We have had higher prices and wider fluctuations, due to combined restrictions or speculation, and the consequent advance has been more or less rapid and fictitious, but we have never before had a metal year when legitimate consumption has overtaken the largest production ever known with reference to copper especially. We have had a year free from strikes and labor disturbances, with conditions favorable to an enormous production, and the same favorable conditions have naturally resulted in a still larger home consumption, combined with an export demand next to the heaviest on record.

Stocks of copper on hand last January were variously estimated at from 50,000 to 75,000 tons, and statisticians to-day can prove to you that there must be a stock of copper on hand at whatever they like to "estimate" it. "Statistics" and "estimates" have all been crushed to dust and scattered to the winds. It matters nothing what the stock of copper was or was not a year ago, it has all been wiped out and melted if it ever existed.

The advance and active buying of copper started late in 1904. Price on January 1, 1905, was 15-25. During the first quarter of 1905 buying was active and the exports were heavy. May, June and July were dull months and prices sagged off to the lowest point of the year, 14.87½. During July market became strong and active and prices steadily advanced to 19½ cents and 20 cents paid during December for spot Lake copper, the highest price of the year. We start the year 1906 with practically no stock of copper on hand and with producers all well sold up for the first three months of 1906. Sales have been made up to June at 18½ cents, and 18.50 to 18.75 stands as the market for deliveries running over the first six months of 1906. For January and nearby deliveries price to-day is more or less nominal at from 19 cents to 19.50. The chief trouble is to find the metal. A lot of "bear" talk has been written about the stock of copper held in China. Some of this copper has been offered in this market and about 200 or 300 tons sold figuring about 18½ cents for March or April delivery. The amount is so small compared to the continued pressing demand, it need not be considered. The exports for December were 18,158 tons, against 19,847 tons last year, making a total export for 1905, of 239,863 tons, against 247,735 for 1904—a falling off of 8,672 tons. In connection with these exports it is to be noted Europe has taken about 50,000 tons less, while China has taken about 38,000 tons more. The total imports of 1905 were 94,600 tons. The outlook for 1906 is bright, and a steady market seems assured for the first half of 1906, at from 19 cents to 19.50 for spot to 18.50 to 18.75 for futures for Lake and Electro. Casting copper carload lots are in small demand and less easily followed. Prices to-day range from 18½ to 18⅝ carload lots.

The London copper market opened strong and active at £68 12s. 6d. Last January reached £64, the lowest point in the Summer, and then steadily advanced to £80 12s. 6d. in December, closing at £79 12s. 6d., thereby following more or less the course of the American market. Trading in London has been very heavy, nearly 70,000 tons of spot copper were dealt in on the London Metal Exchange and over 107,000 tons of futures.

TIN.—During the month of December the price of pig tin in the London and the New York market reached the highest point in several years. Towards the close of the month prices re-acted sharply on a report that the shipments from the Straits would be 5,700 tons or more for the month, and some London holders let go. The total shipments were only 4,885 tons, against 5,010 in November and 5,142 tons, December, 1904. Spot stocks in America are to-day estimated at 851 tons and the market has hardened considerably. With price of future tin to-day 10s. above the price of spot, the market is as strong as at any time during the last few months.

The course of the tin market during the year just past has been a remarkable one. January, 1905, spot tin in London opened at £132 2s. 6d., and tin in New York 29.10c. After selling off a few points in February the market for the balance of the year has been continually advancing, and the London bull operators have had the market entirely under control and their judgment of the situation has been a complete success. In the New York market there has been no speculation and no leading interest to make a market. We have all been content to follow in the wake of the London bulls and buy our supplies from them at their own price. We have never had such a steadily and consistently advancing market in pig tin in a good many years, and any operators here on the bull side could have realized a fair sized fortune on a very small outlay.

The total consumption in America increased 3,204 tons over 1904, and that increase is very small compared with the enormous increase in the consumption of copper. The deliveries for 1905 were 38,600 tons, against 35,300 for 1904. Arrivals of tin in 1905 were 38,210 tons, aganst 37,503 in 1904. We received 707 tons less in 1905 as compared with 1904 and consumed 3,204 more during the same period. The visible supply during the year decreased 1,317 tons, and the shortage of 1,887 tons is put down as coming from "invisible" stocks. The tin market closes very strong and the situation looks as good and as sound as ever. Stocks are light, and despite the heavier arrivals we shall probably have to buy more tin in the London market. Spot tin, 5 and 10 ton lots, is quotable at 36 cents; tin to arrive about 14th, 35.75 cents; 1 ton lots, 10 to 15 points higher.

LEAD.—The foreign lead market has followed in the advance of all other metals and some high levels have been reached. A year ago foreign lead sold at £12 18s. 9d. and advanced to £17 15s., closing at £17 8s. 9d.

In the New York market lead has apparently suffered from a short supply and a big demand and prices have been put wherever the trust felt like. Last January lead sold at 4.60 New York delivery and prices were steadily advanced to 5.60, New York shipment price at the close. This price does not represent the actual market price for spot lead in New York, but is the price the trust asks for shipment lead from the West. Considerable foreign lead has been imported owing to the scarcity and high prices, but at the close supplies are coming along more freely and the heavy premium on spot lead is likely to disappear.

SPELTER.—Foreign spelter has shared in the general advance but hardly in proportion to the other metals. January, 1904, spelter sold in London at £25 5s., and prices gradually advanced, with slight fluctuation to £29 7s. 6d., closing at £29 2s. 6d.

In the New York market last January spelter sold at 6.00 cents against 6.65 asked to-day. The scarcity of ores has led to the advance. The shipments of ore from the Joplin district for the year 1905 were 252,435 tons, against 267,239 tons in 1904. From St. Louis the receipts for the year 1905 were 3, 364,955 slabs, against 3,061,890 slabs in 1904. The shipments from same port were 3,340,420 slabs in 1905, against 2,970,518 slabs in 1904.

The market is quiet but firm, 6.50 bid at St. Louis or 6.65 New York delivery. Carload lots are in small demand and less easily followed. Prices to-day range from 18½ to 18⅝ for carload lots.

ALUMINUM.—For the first time in five years there has been a change in the price of aluminum. The manufacturers have advanced the rate two cents per pound for both ingot and sheet, claiming that the higher rates for raw materials and increased costs of manufacture necessitated the increase in price. Pure aluminum ingots are quoted at 38 cents per pound in small lots and 35 cents per pound for ton lots. Sheet is on a basis of 44 cents per pound.

SILVER.—The silver market has been active and new high levels have been reached. There has been considerable speculation in the market at times. A years ago silver in London was quoted at 28 5-16d. and in New York official quotation at 61⅜c. Prices reached 30 15-16, highest in London, 65¾c. in New York, and closed at 29 15-16d. London and 64c. New York. The production of silver in America increased 1,000,000 ounces during the year. With Mexico now established on a gold basis and with more silver to sell we are hardly likely to see any permanent advances in the price of the white metal this year.

OLD METALS.—The old metal market has shared in the general advance. The demand for all kinds of brass and copper scrap has been active and stocks have been pretty well cleaned up. The year 1905 started in good shape with the active advance in copper early last January. The market for scrap followed suit and dealers with stocks on hand were able to realize. The steady advance during the year in metals and the active foreign demand has kept

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

the market moving along rapidly. Zinc dross and skimmings, lead and tin drosses have been in demand, and prices have all shown a substantial advance. Starting a year ago prices have advanced from 3½ to 4c. per pound. The demand during the last month of 1905 has not been so active, but with the continued strong copper market and the higher prices for tin, spelter and lead the old metal market opens up well and the outlook is decidedly promising for a good active year for all kinds of scrap metals, skimmings and drosses.

TRADE WANTS

Advertisements will be inserted under this head at 30 cents per line, 4 lines one dollar, for each insertion. Answers sent in our care will be forwarded.

MACHINERY, METALS AND EQUIPMENT.

WANTED—Rolling mill about 12 inches diameter, 18-inch face. Also drawing press for work up to 5 inches high. Address FLORENCE SILVER PLATE COMPANY, 530 North Gay street, Baltimore, Md.

WANTED—Gas kiln, new or second hand, for firing glass and china. State price. Address KILN, care THE METAL INDUSTRY.

WANTED—One second hand crusher for extracting brass from ashes. Address MR. SMITH, care of W. D. Allen Manufacturing Company, 151 Lake street, Chicago, Ill.

WANTED—Second hand safe, about 18 x 24 x 40 inches inside. Must be in good condition. Address E. K., care THE METAL INDUSTRY.

WANTED—One 42-inch SCHWARTZ FURNACE in good condition. Address SCHWARTZ, care THE METAL INDUSTRY.

FOR SALE.

ROLLING MILL EQUIPMENT FOR SALE—One stand, 16x32, and one stand 17x24 chilled rolls, with two sets driving gear, all complete. One 4 ft. by 8 ft. annealing furnace. One No. 4 Cincinnati geared squaring shear, 36 in. knife. One No. 205 Niagara circle slitting shear. One heavy Farrell foundry, slitting shear, slits 3-16 stock, in use only one year and practically new. Also 12x30 Corliss engine and boiler complete; used to drive above, and several other items, pickle and water tubs, etc., for use in rolling sheet silver, brass or kindred metals. Address ROLLING EQUIPMENT, care THE METAL INDUSTRY.

FOR SALE.—Three Hill barrels for recovering metal from brass ashes. First-class condition. Address HILL BARREL, care THE METAL INDUSTRY.

HELP WANTED.

WANTED—Foreman for plating room by large Western company, running about 12,000 gallons of solution of nickel copper electro galvanizing, etc. Must thoroughly understand plating in all its branches, be a hustler and possess good executive ability. For such a person this is an exceptional opportunity. In answering state age, experience, by whom employed and salary expected. Address HUSTLER, care THE METAL INDUSTRY.

WANTED—A practical electro plater for cast metal novelties; must understand ormolu gold and fancy finishes. Address A. B. C., care THE METAL INDUSTRY.

WANTED—A competent man to take charge of packing and shipping department of large mill in State of Connecticut. Also a fancy wire drawer; one capable of making his own tools. Address by letter, WIRE MILL, care THE METAL INDUSTRY.

WANTED for our new shop—First class, experienced monitor hands and brass workers; those accustomed to steam work preferred. Apply at the works of the NATHAN MANUFACTURING COMPANY, 416 East 106th street, New York.

WANTED—Foundry foreman for brass foundry. Good position for right man. State experience. Address MIXTURES, care THE METAL INDUSTRY.

WANTED—BRASS FOUNDRY FOREMAN, Cleveland, Ohio. Non-union, must know how to handle men. Must be first class MOLDER and METAL MIXER, and experienced with all kinds of light and heavy work and general jobbing in brass, bronze, and aluminum, automobile work, etc. Address FIRST CLASS MOLDER, care THE METAL INDUSTRY.

WANTED—SUPERINTENDENT for a new aluminum factory; must be experienced; to be in full charge; given interest if found satisfactory. Address ALUMINUM SUPERINTENDENT, care THE METAL INDUSTRY.

WANTED—Salesman to sell crucibles; give age, experience and salary expected. Address BRASS CRUCIBLE, care THE METAL INDUSTRY.

SITUATIONS WANTED.

PLATER, steady, sober man with ten years' experience in all kinds of plating and coloring, wishes position in New York State. Address J. FLECKENSTEIN, 155 Minna street, San Francisco, Cal.

FOREMAN PLATER with 20 years' experience, 17 years with one firm, desires position with manufacturing concern. References. Address WM. GRANTMAN, 320 E. Livingston street, Columbus, O.

POSITION WANTED by young man, 33, as superintendent of hardware factory; 17 years' experience in manufacture of light hardware; lowest to highest grade, that of duplicate or interchangeable parts, in brass, bronze, iron and steel, cast and wrought metals. Experienced in metal pattern making, drafting and designing of tools, jigs, fixtures, labor-saving devices and auto machinery, combined with inventive and executive ability. Address SUPERINTENDENT, care THE METAL INDUSTRY.

MISCELLANEOUS WANTS.

THE ADVERTISER seeks to meet a thoroughly practical man with a little capital to engage in the manufacture of Art Metal Goods. Address X. Y. Z., care THE METAL INDUSTRY.

WANTED—A small brass foundry, with or without machine shop, preferably in suburban location near New York. Address FOUNDRY, care THE METAL INDUSTRY.

CASH PAID for old precious metals and minerals in any form. Gas mantle dust, bronze powder, bismuth, platinum, mercury, nickel, etc. Address JOSEF RADNAI, 284 Pearl street, New York City.

AGENCY WANTED—Want good selling article; metal goods preferred; other lines considered; have large store with bulk windows on main street in Philadelphia; would introduce new goods; established 40 years in metal line. Address NELLA, care THE METAL INDUSTRY.

INFORMATION BUREAU

Subscribers intending to purchase metals, machinery and supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Our Information Bureau is for the purpose of answering questions of all kinds. Send for circular.

Metal Prices, January 10, 1906

METALS.

	Price per lb.
COPPER, PIG, BAR AND INGOT AND OLD COPPER	
Duty Free. Manufactured 2½c. per lb.	
Lake, car load lots	$19.50
Electrolytic, car load lots	19.50
Casting, car load lots	18.75
TIN—Duty Free.	
Straits of Malacca, car load lots	36.50
SPELTER—Duty 1½c. per lb.	
Western, car load lots	6.65
LEAD—Duty Pigs, Bars and Old 2½c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead, car load lots	6.00
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	38.00
100 lb lots	36.00
Ton lots	35.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons, cask lots	15.00
Hallets, cask lots	14.25
Other, cask lots	14.00
NICKEL—Duty 6c. per lb.	
Large lots	.45 to .50
Small lots	.50 to .65
MANGANESE—Duty 20%	.80
MAGNESIUM—Duty Free	$1.50 to $2.00
BISMUTH—Duty Free	1.50 to 1.60
CADMIUM—Duty Free	.95 to 1.00
PHOSPHORUS—Duty 18c. per lb.	
Large lots	.42
Small lots	.50 to .75
	Price per oz.
GOLD—Duty Free	$20.67
SILVER—Duty Free	.65
PLATINUM—Duty Free	24.00
QUICKSILVER—Duty 7c. per lb. Price per Flask	41.00

OLD METALS.

	Price per lb.	
Heavy Cut Copper	$16.50	$17.00
Copper Wire	16.00	17.00
Light Copper	14.75	15.00
Heavy Mach. Comp	14.50	15.00
Heavy Brass	11.25	11.75
Light Brass	9.25	9.75
No. 1 Yellow Brass Turnings	10.00	10.50
No. 1 Comp. Turnings	11.00	11.50
Heavy Lead	5.30	5.50
Zinc Scrap	5.00	5.25
Scrap Aluminum, sheet, pure	22.00	25.00
Scrap Aluminum, cast, alloyed	12.00	18.00
Old Nickel	15.00	25.00
No. 1 Pewter	23.00	25.00

	Price per lb.	
SILICON COPPER—		
500 lb. lots		.35
100 lb. lots		.36
Small lots		.38
PHOSPHOR COPPER	.28 to	.30

	Price per lb.
ZINC—Duty, sheet, 2c. per lb.	
600 lb. casks	8.50
Open casks	9.00

PRICES OF SHEET COPPER.

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb. sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	23	23	23	23	23	24
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	23	23	24
	Longer than 96 ins.	23	23	23	2	23	25
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	23	23	23	23	23	25
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	23	23	25
	Longer than 96 ins. Not longer than 120 ins.	23	23	23	23	24	26
	Longer than 120 ins.	23	23	23	24	25	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	23	23	23	24	25	27
	Longer than 72 ins. Not longer than 96 ins.	22	23	23	24	26	28
	Longer than 96 ins. Not longer than 120 ins.	23	23	23	25	27	31
	Longer than 120 ins.	23	23	24	26	29	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	23	23	23	24	26	29
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	25	27	32
	Longer than 96 ins. Not longer than 120 ins.	23	23	24	26	29	
	Longer than 120 ins.	24	24	25	27	31	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	23	23	24	26	31	
	Longer than 96 ins. Not longer than 120 ins.	23	23	25	28	33	
	Longer than 120 ins.	24	24	26	31		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	24	24	26	29		
	Longer than 96 ins. Not longer than 120 ins.	25	25	27	30		
	Longer than 120 ins.	26	26	28	32		
Wider than 108 ins.	Not longer than 132 ins.	27	27	29			
	Longer than 132 ins.	28	28	31			

Rolled Round Copper, ⅝ inch diameter or over, 23 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 2½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, January 10, 1906

Net Cash Prices.

COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb. ..... 27c.
Lighter than 10 oz. ..... 33c.
10 oz. and up to 12 oz. ..... 30c.
12 oz. and up to 14 oz. to square foot, per lb. ..... 28c.
Circle less than 8 in. diam., 2c. per lb. additional.
Circles over 13 in. diam. are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS.

Prices are for 100 lbs. or more of Sheet Metal in one order.

Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and	2	12	14	16	18	20	22	24	26	28
including	12	14	16	18	20	22	24	26	28	30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from list 17½ per cent.

PRICE LIST FOR BRASS AND COPPER WIRE.

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass.	Low Brass.	Gilding Bronze and Copper.
All Nos. to No. 10, Inc.....	$0.23	$0.27	$0.28
Above No. 10 to No. 16.....	.23½	.27½	.28½
Nos. 17 and 18.....	.24	.28	.32
" 19 and 20.....	.25	.29	.33
No. 21.....	.26	.30	.34
" 22.....	.27	.31	.35
" 23.....	.28	.32	.36
" 24.....	.30	.34	.38

Discount, Brass Wire, 15 and 2½ per cent.; Copper Wire, 15 and 2½ per cent.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ in. to 3½ in. O. D. Nos. 4 to 13 Stubs Gauge, 22c. per lb.
Seamless Copper Tubing, 25c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size.	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb..	30	29	24	23	22	22	22	22	22	22	22	23	24	26	28	29

BRAZED BRASS TUBING.

Brown & Sharpe's Gauge the Standard.

									Per lb.
Plain Round Tube,	¾	in.	up to	2	in.,	to No.	19,	inc	$0.35
" " "	⅞	"	"	2¼	"	"	19,	"	.36
" " "	1	"	"	2½	"	"	19,	"	.38
" " "	1⅛	"	"	2¾	"	"	19,	"	.41
" " "	1¼	"	"	3	"	"	19,	"	.48
" " "	1⅜	"	"	3¼	"	"	19,	"	.65
" " "	1½	"	"	3½	"	"	19,	"	1.00
" " "	1⅝	"	"	4	"	"	19,	"	1.50
Smaller than ⅞ inch									Special
2 inch to 3 inch, to No. 19, inclusive									.38
3 inch									.40
Over 3 inch to 3½ inch									.45
Over 3½ inch									.50

Bronze and copper advance 3 cents. Discount 25 and 5 per cent.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than and including	*3in. 12in. in coils.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.	Cutting to Length.	Polishing or Satin Finishing one Side.
W. 13 and heavier..	44	44	46	46	46	46	49	49	49	1	2
" 14.....	44	44	46	46	46	46	49	49	49	1	2
" 15.....	44	44	46	46	46	46	49	49	49	1	2
" 16.....	44	44	46	46	46	46	49	49	49	1	2
" 17.....	44	44	46	46	46	46	49	49	49	1	3
" 18.....	44	44	46	46	46	46	49	49	52	1	3
" 19.....	44	44	46	46	46	46	49	50	53	1	4
" 20.....	44	46	46	46	46	48	51	52	54	1	4
" 21.....	44	48	48	48	48	50	53	54	60	2	5
" 22.....	44	48	48	48	50	50	53	57	61	2	5
" 23.....	44	48	48	48	50	50	53	59	62	2	6
" 24.....	44	48	50	52	52	52	55	61	64	2	6
" 25.....	46	49	51	53	53	53	56	63	67	2	7
" 26.....	46	49	52	56	56	56	61	65	71	2	8
" 27.....	46	50	54	58	58	59	64	68	74	2	10
" 28.....	46	50	56	58	59	59	66	72	77	2	11
" 29.....	48	51	58	60	62	62	71	77	82	2	13
" 30.....	48	52	60	62	66	72	79	82	87	2	15
" 31.....	50	54	62	65	70	78	81	84	90	3	17
" 32.....	52	56	64	68	76	84	91	97	102	3	19
" 33.....	54	58	67	72	80	91	98	107	117	3	21
" 34.....	57	62	69	77	85	98	110	117	127	3	25
" 35.....	..	72	77	87	97	107	122	132	..	..	..*
" 36.....	..	87	97	107	122	127	142	..	..	..	..
" 37.....	..	102	112	127	142	157	172	..	..	..	..
" 38.....	..	122	137	152	167	182	202	..	..	..	..
" 39.....	..	142	162	182	202	222	..	..	..	..	..
" 40.....	..	172	202	222	242	..	..	..	..	..	..

*Polished or scratch brushed 2 sides, double above prices.

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

Discounts as Follows are Given for Sheet Orders Over 200 Pounds.

200 to 1,000 pounds..... 10 per cent. off list.
1,000 to 2,000 " 10 per cent. and 2 " "
2,000 to 4,000 " 10 " " 3 " "
4,000 pounds and over 10 " " 5 " "

PRICE LIST OF SEAMLESS ALUMINUM TUBING—STUBS' GAUGE.

Stubs' G.	¼"	⅜"	½"	⅝"	¾"	1"	1½"	2"	2½"	2¾"
4 to 11....	..	..	96	86	83	77	67	61	61	61
12.....	..	1.08	96	86	83	77	67	61	61	61
13.....	..	1.08	96	86	83	77	67	64	64	64
14.....	..	1.08	96	86	83	77	67	64	64	64
15.....	..	1.12	96	89	86	80	70	67	67	67
16.....	..	1.15	99	93	89	83	70	70	70	70
17.....	..	1.18	1.02	96	93	86	73	73	73	73
18.....	1.85	1.24	1.05	99	93	86	77	77	77	80
19.....	1.88	1.28	1.08	1.02	99	93	83	80	80	83
20.....	1.95	1.31	1.15	1.08	1.05	99	89	86	86	89
21.....	2.01	1.37	1.21	1.15	1.12	1.05	99	93	93	96
22.....	2.17	1.44	1.24	1.18	1.15	1.08	1.05	99	1.05	1.05
23.....	2.33	1.50	1.31	1.24	1.21	1.15	1.15	1.08	1.15	1.15
24.....	2.48	1.60	1.37	1.31	1.28	1.18	1.21	1.21	1.24	..
25.....	2.65	1.69	1.47	1.37	1.34	1.28	1.34	..	..	..

Prices are for lots of 50 lbs. Boxing extra. Smaller, larger and intermediate sizes furnished by manufacturers.

Discounts as Follows are Given for Tube Orders Over 50 Pounds.

50 to 200 lbs..... 5 per cent. discount off list.
200 to 2,000 lbs. ..... 10 " " "
2,000 to 4,000 lbs. ..... 10 and 3 " " "
4,000 lbs. and over..... 10 and 5 " " "

PRICE LIST FOR ALUMINUM ROD AND WIRE—B. & S. GAUGE.

Diameter B. & S. G'ge.	0000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	40	40½	40½	41	41½	42	42½	43	44	45	46	49	54

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12.....	$0.52	16.....	.58
13.....	.53	17.....	.59
14.....	.54	18.....	.60
15.....	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50 per cent.